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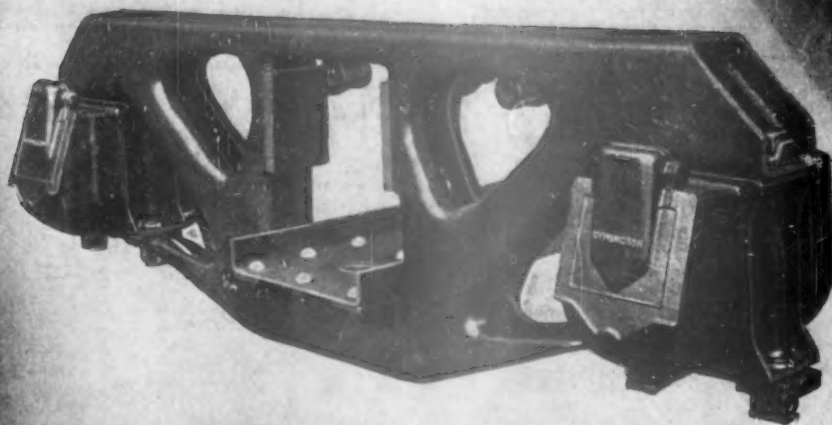
FIRST HALF OF 1923—No. 1

NEW YORK—JANUARY 6, 1923—CHICAGO

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Volume 74

Number 1

Published Weekly by Simmons-Boardman Pub. Co., Woolworth Bldg., New York, N. Y. Subscription Price U. S., Canada and Mexico, \$6.00; foreign countries (excepting daily editions), \$8.00, and \$10.00 a year, including all dailies; single copies, 25c. Entered as second-class matter January 30, 1918, at the post office at New York, N. Y., under the act of March 3, 1879.

EDITORIAL



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The Revival of Railroad Development

THE statistics which are published elsewhere in this issue of the *Railway Age* show clearly that a real revival of the development of the railways has begun and that progress in this respect will continue rapidly for some time to come unless arrested by unwise and unfair regulation.

Our statistics for 1922 show that in that year the railways, industrial concerns and private car lines placed the largest orders for freight cars with the builders in any year since 1912. They show that the orders placed for locomotives were the largest since 1918 and the orders for passenger cars the largest since 1916. The construction of new mileage shows the same languishing tendency that it has for some years. But the additions and betterments made as well as the new equipment ordered for increasing the capacity of the existing lines were relatively substantial. There were installed 1,539 miles of block signals, United States and Canada, of which 1,247 were automatic block, as compared with 824 miles in 1921, of which 614 were automatic. There were installed 107 interlocking plants, as compared with 59 in 1921.

Even more significant perhaps than the statistics regarding what was done in 1922 is the information presented in the article entitled "Railways Will Make Many Improvements in 1923." This article gives data furnished by twenty-seven railways with a mileage of approximately 95,000 miles, showing that they have plans for making capital expenditures in 1923 aggregating over \$350,000,000. These railways have less than 40 per cent of the mileage of the country. Statements made by some of their chief executives indicate that even they may spend more than their present plans contemplate if conditions are favorable. The railways having the remaining more than 60 per cent of the total mileage also undoubtedly will make substantial expenditures if conditions are favorable. It seems reasonable, therefore, to estimate that if conditions are reasonably favorable during the year the total capital expenditures made will be around \$700,000,000.

This would make the total capital expenditures in 1923 the largest for ten years, except in 1917, when the investment in railway properties showed an increase of \$742,000,000. We should hesitate to make a forecast so optimistic if similar views were not expressed by some leading railway executives. For example, W. B. Storey, president of the Atchison, Topeka & Santa Fe, in an article that we publish elsewhere in this issue, anticipates that "there will be a very substantial increase in railway facilities in 1923—probably a greater in-

crease than for any year since the war, but not enough," as Mr. Storey significantly adds, "to supply the deficiency caused by several years' stoppage of growth."

The budgets of some systems, as shown by the article summarizing them which is published elsewhere, are quite large. The New York Central Lines plan to spend about \$29,000,000 for additions and betterments and have still to receive most of the new cars and locomotives, for which contracts amounting to approximately \$54,000,000, have been let. The Pennsylvania System carries over to the new year a program of about \$55,000,000. The Illinois Central's budget for 1923 totals more than \$42,000,000; that of the Louisville & Nashville about \$27,000,000; that of the Norfolk & Western about \$32,000,000, and that of the Union Pacific about \$20,000,000.

What was done in 1922 and what it is planned to do in 1923 shows that the managements of the railways are prepared to use the utmost resources at their command to so enlarge the capacity of the railways as to enable them to cope with the demands of business. But in all that the railway executives say regarding the plans for the future there is sounded a note of warning regarding the effect that would be produced upon these plans by hostile legislation and unfair regulation. For example, in an article published elsewhere in this issue C. E. Schaff, president, Missouri, Kansas & Texas, says: "The attitude of the public, public officials and regulating bodies will, of course, have a marked influence upon the financial condition of the railroads, and the result of this influence will in turn have great bearing upon the expenditures to be made for additions and betterments." J. H. Hustis, president of the Boston & Maine, says: "If the Transportation Act is to be given a fair trial there is hope as to the future. If it is not to be given a fair trial then no one can reliably predict what is ahead for the railroads." H. E. Byram, president of the Chicago, Milwaukee & St. Paul, says: "The prospect for increases in railroad facilities is largely dependent upon net earnings of the railways, because in order to make improvements large amounts of capital must be borrowed, and that capital can be made available only at reasonable prices, and if the earnings of the railroads are sufficient to satisfy the lender that his investment will be safe if loaned to the railways for making increased facilities."

The significance of such statements from railway executives should not, in view of past experience, be minimized. There are many people who seem to think that the railways

have some mysterious source not available to other persons and concerns from which they can get new capital regardless of the net return earned by them. The fact that with net earnings so poor as they have been during recent years the railways are now making and carrying out large plans for improvements may appear to lend some support to this view. The incontrovertible fact is, however, that in past years the capital investment made in the railroads has depended directly upon the net return earned by them, and almost invariably has increased when the net return has increased and declined when the net return has declined. The efforts the railways are now making to increase the capacity of their plants are due to the obviously very pressing need for increasing their capacity and to the hope that they will be allowed to earn enough net return to justify the capital expenditures being made and which are contemplated. Nothing could be more certain than that the program of expansion now being carried out will be arrested if government regulation prevents an increase in the net return earned commensurate with the increases in traffic which are occurring.

The situation, then, is that the business of the country imperatively requires an increase in railroad capacity,

that the managements of the railways are trying to make this increase and that whether they will be allowed to make it or not will be determined by public sentiment and government regulation. When the people of the country, especially of the western states, last November elected to Congress a large number of radicals whose stock in trade consists of attacks upon the railways and advocacy of a restrictive and vicious policy of regulation the people voted against the expansion of the railroads which the public's own welfare imperatively demands. The railways nevertheless are going ahead with plans for extensive improvement and showing confidence that American public sentiment will not permit adoption of the radical policies advocated by men such as Capper of Kansas, La Follette of Wisconsin, Brookhart of Iowa, Howell of Nebraska, Shipstead of Minnesota and Dill of Washington. What will public sentiment really do? Will it back the railway executives who are trying to furnish the country the service it needs, or men of this class who for their own selfish political purposes are advocating policies that would prevent the railways from furnishing the service the country needs?

Scope of the Commission's Investigation Too Narrow

THE Interstate Commerce Commission has announced a general investigation concerning the adequacy and condition of freight cars and locomotives and the customs and practices prevailing or desirable with respect to the ownership, use and interchange of cars. The Commission has made the scope of its investigation much too narrow. Having gone thus far it should go farther and make an investigation of the adequacy and condition of all railroad facilities.

The country has just passed through the largest so-called "car shortage" in its history. This has focused public attention upon the situation of the railways with respect to equipment. Undoubtedly there is a shortage of equipment. But suppose that suddenly the amount of equipment should be greatly increased and all of it should be put in normal condition. Would this remedy the present transportation situation?

It is doubtful if it would materially improve it. The capacity of a railroad does not depend entirely or even mainly on the amount and condition of its equipment. It depends more upon the amount and character of its other facilities. If all the other facilities of the railways were suddenly increased without any increase in their equipment this would immediately enable them to handle a largely increased business. They would then be able to increase the amount of service rendered with each locomotive and car. If, on the other hand, the number of locomotives and cars alone should suddenly be greatly increased the result would be a reduction of the average miles traveled daily by each locomotive and each car, and relatively little increase in the total amount of freight that could be handled.

What the Commission ought to investigate and inform the

public is whether there really is a shortage of means of railroad transportation. It also ought to investigate why, if there is such a shortage, it exists, and how it can and should be remedied.

The railroads are being criticised and denounced in all parts of the country because they have not been and are not now able to handle satisfactorily all the business offered to them. Railway executives and other students of railway affairs say that the railways should not be criticised and denounced because they are not responsible for this condition. They say it is due to the fact that government operation and government regulation of the railways have arrested their development. They maintain that government regulation has arrested the development of the railroads by so reducing and restricting the net return earned by them as to render it impossible for them to be normally developed.

It will do little or no good for the Commission to ascertain the facts regarding the inadequacy and conditions of equipment. Most of the information for which it has asked in its questionnaire already is in its own possession. When it has got all the additional information for which it has asked, the transportation problem of the country will be no nearer a solution than it is now. There will still remain to be answered the question as to why the existing equipment is inadequate and much of it is in bad order. There will still remain to be answered the question whether other facilities are adequate, and, if not, how inadequate they are. There will still remain to be answered the question of who and what are really responsible for the situation.

The Commission will fall far short of performing its duty if it does not greatly broaden the scope of its investigation.

The Commission and other regulating bodies are strangely prone to ignore the fact that they have a duty to perform with respect to the provision of adequate means of transportation as well as the owners and managers of the railways.

It is the duty of the regulating authorities to make it possible for the owners and managers of the railways to provide sufficient means of transportation. It is the duty of the

owners and managers to provide sufficient transportation only if the regulating authorities make it possible for them to do so.

The investigation should include an inquiry into whether the regulating authorities have made it possible for the railways to provide sufficient means of transportation as well as into whether the railways have done all that the regulating authorities have made it possible for them to do.

Past and Prospective Net Return

THE YEAR 1922 was a very unusual one for the railways in many important respects. The revival of business, the coal strike, the shop employees' strike and the general reduction of rates on July 1 caused an erratic and unprecedented series of developments. The number of carloads of all kinds of freight moved, except coal, was larger throughout the year than in 1921. Up to December 9 the total cars loaded with commodities other than coal had been 34,385,718, as compared with 33,579,671 in 1920. Coal loadings had been 6,893,928, as compared with 9,506,677 in 1920. Total in 1920, 43,086,348; in 1922, 41,278,646. The coal strike, however, prevented the total freight business from becoming as large as it otherwise would have become until September.

Before coal began to move in normal volume, reduced rates and the shop employees' strike had been in effect for over two months. The shop employees' strike was due to reduction of wages. If the coal strike and the shop employees' strike had not occurred, these reductions of railway wages should have caused reductions of railway expenses. But instead of expenses declining after July 1, the shop employees' strike and advances in the price of coal caused them to increase.

This unusual series of developments made the trend of total earnings, operating expenses and net return different, we believe, from what it ever was before. For years it has been accepted as axiomatic that the railways would earn much more net return in the second half of the year than in the first half. In 1921, when reductions of wages were made in midsummer, there was a large increase in the net return earned in the second half of the year. The net return earned in the first six months of 1922 was almost \$203,000,000 more than in the first six months of 1921. The net return earned in the first six months of 1921 was \$145,640,000, and in the first six months of 1922, it was \$348,387,000. On the other hand, in the four months from July to October, inclusive, 1922, the net return earned was \$87,500,000 less than in the same months of 1921. The net operating income earned in these months of 1921 was \$353,700,000, while in 1922 it was only \$266,240,000.

Perhaps the most remarkable fact of all is that in the four months ending with June, 1922, the net operating income earned was about \$6,000,000 greater than in the four months ending with October. Normally, figures of the net return earned in these two periods of four months have been almost exactly the reverse. The figures for 1922 present an even sharper contrast to those of normal years in the light

of the fact that the freight business moved after July 1 was much larger than it was in 1921.

These most unusual changes in net return naturally raise serious questions regarding the net return that probably will be earned in 1923. If the net return should show such reductions in 1923 as it did in the latter half of last year, the consequences would be bad for the railways and the public. The following developments affecting net return in 1923 seem probable:

First, an increase in both freight and passenger business as compared with 1922. General business promises to continue to be active. There is serious danger of another strike in the bituminous mines on April 1, but it seems very improbable that if one comes it will be so protracted as that of 1922. Whether shipments of agricultural products will be as heavy as in 1922 will depend upon the crops. On the whole, it may safely be said that there are not in sight any prospective developments which will prevent total freight business in 1923 from being larger than in 1922. In fact, there are reasons for believing that it will be larger than in any previous year. There is also prospect of an increase of passenger business. It usually follows freight business in its fluctuations, and it may be a significant fact that in the month of October passenger earnings were larger, for the first time in the year, than in the corresponding month of 1921.

Second, the reduction of net return in the latter part of 1922 was largely due to the increase of operating expenses. Up to August, operating expenses in 1922 were less in every month than in the corresponding month of 1921. Beginning with August they showed increases over the corresponding months of 1921, in spite of reductions of wages. These increases were due to increases in maintenance of equipment expenses caused by the shop employees' strike, and to advances in the price of coal caused by the coal strike. Maintenance of equipment expenses will continue to be heavy for some time because there is still a large amount of equipment, especially of locomotives, in bad order. It is probable, however, that these expenses have reached their peak and that their general tendency this year will be downward. It is also safe to predict that if there is not another coal strike the cost of coal will decline.

Third, there is a strong agitation for further reductions of rates on farm products, but, with the exception of the farmers, shippers generally seem to recognize the fact that fur-

ther reductions of rates under present conditions would do harm and no good. There is no prospect of a general reduction of rates this year, and it seems very doubtful that the Interstate Commerce Commission, with railroad earnings and expenses what they are now, and prices increasing, will grant a further reduction of rates on farm products.

On the whole, therefore, the prospect is that the net return earned by the railways in 1923 will be larger than in either 1921 or 1922. That this is the view of many railway executives is indicated by the letters from a number of them that we publish elsewhere in this issue. The financial results of

operation in the last six months of last year were extremely disappointing, but 1922 was a very unusual year, and the latter half of it especially was characterized by developments and conditions which were almost unprecedented. Of course, as has been true for years, financial results in 1923 will depend largely upon the policy followed by the regulating authorities with respect to rates. The managements of the railways undoubtedly will reduce operating expenses relatively to the traffic handled, which probably will cause an increase in net return if the regulating authorities do not make further unwarranted reductions of rates.

Transportation Service, Past and Prospective

THE *Railway Age* anticipated in its last Annual Review Number, which was issued on January 7, 1922, that the year 1922 would be "another year of struggle." This anticipation certainly was fully realized.

There was a struggle over freight rates and the railways lost it, general reductions of rates being made on July 1. There was a struggle over wages, and the railways won it, reductions in the wages of most classes of employees being made on the same date. There was a struggle between the railways and their shop employees, which was the result of the strike of these employees, and the railways won it. Some roads settled on terms which the employees originally refused to accept. Others have not settled, and are still paying a high price in increased operating expenses, but in spite of the continuance of the strike, are succeeding in operating fairly satisfactory. The railways had a hard struggle with freight business, of which more was offered after the coal strike ended early in September than ever before. They were fairly successful in this struggle also and have moved more carloads of freight since the coal mines opened than in the corresponding part of any previous year.

The volume of freight business which has been moved since the middle of September has been remarkably large considering the conditions. When the shop employees' strike began on July 1 there were 324,583 freight cars, or 14.3 per cent of the total number in the country, in bad order. There were also 11,318 locomotives, or 17.6 per cent of the total number, which needed repairs requiring over 24 hours of work. One month later, on August 1, the number of freight cars in bad order had increased to 345,013, or 15.3 per cent of the total number. This was the largest figure reached. While from that time the number of cars reported in bad order declined, the number of locomotives in bad order continued to increase, and on September 15 was 16,572, or 25.8 per cent of all locomotives.

This was just about the time when enough coal mines were opened to give the railroads a normal, or rather abnormal, coal traffic. Never in history was there a worse time to have a large number of locomotives in bad order, and never, probably, were there relatively more in bad order. Many people predicted that the railways would "break down" under the strain. Some, especially the strike leaders,

not only predicted, but hoped that they would. But within a few weeks, in spite of the number of cars and locomotives in bad order, the railways were moving more carloads of freight than in any previous year, except 1920.

Before the coal strike was settled the mines were producing and the railways were transporting less than five million tons of coal a week. The country had become very short of coal, and on all hands there were predictions and fears of a serious coal shortage. The *Railway Age*, in an editorial in its issue of September 9, said: "While favorable weather conditions prevail the railways may be able to move an average of 11,000,000 tons of coal a week. It is not reasonably to be expected that they will be able to do much better than this on the average." The amount of coal actually transported from the mines from the middle of September to December 16 averaged 10,410,000 tons a week. The amount moved would have been greater, except for the fact that owing to demoralized conditions the average distance the coal had to be carried proved to be longer than had been anticipated, and it therefore took coal cars longer to make round trips. In the year 1921, up to December 16, the amount of coal that had been produced was 391,661,000 tons. In the year 1922, up to December 16, the amount of coal that had been produced was 387,452,000 tons. In spite of a coal strike which lasted five months, the amount of bituminous coal mined and transported in 1922 was about the same as in 1921. The coal transported since the middle of September has been about 1½ million tons a week less than in the fall and winter of 1920 when the highest record was made.

Since the freight business in 1923 promises to be very heavy, it is worth while to consider how well the railways probably will be able to cope with it. In a letter published elsewhere in this issue L. F. Loree, president of the Delaware & Hudson, estimates that with existing facilities the railways can handle 15 per cent more freight than they did in the record year 1920. This doubtless is predicated upon the assumption that existing equipment will be put in good condition and that the best practicable use will be made of it. The condition of locomotives and cars is slowly but surely being improved. The number of freight cars in bad order on November 15 was 235,660. This was 10.4 per cent of the total number, a reduction since August 1 of almost 90,000.

The number of locomotives in bad order on November 15 was 15,120. This was 23.5 per cent of the total number, but it represented a reduction since September 15 of 1,452. The number of new freight cars put into service from January 1 to December 1 was 65,772, and the number of new locomotives put into service in the same eleven months was 1,118. There are no figures available regarding the numbers of cars and locomotives retired during this period, but perhaps there has been some increase in the number of both in service. Furthermore, many new freight cars and locomotives that have been ordered are under construction.

As the condition of equipment is improved and operating conditions become more normal there should be a marked increase in the efficiency with which the existing facilities are used. The statistics of the railways as a whole regarding the utilization of equipment have not been anywhere near as good recently as they were in the latter part of 1920. The latest complete statistics regarding the utilization of equipment for a full month are those for September, 1922. In that month the average miles per car per day were only 24.1 as compared with 28.2 in 1920, a decline of 4.1 miles. The average tons per loaded car were only 27.3 as compared with 30, a decline of 2.7 tons. The result was that the net ton-miles per car day were only 466 as compared with 566 in 1920. The net tons per train were only 721 as compared with 746. The average speed of trains increased from 10.2 miles an hour to 10.5, and the average ton-miles per train

hour in September, 1922, were 7,570, as compared with 7,609 in September, 1920. The average miles per locomotive per day was only 54 as compared with 65.7 miles in September, 1920. Every one of these statistics of operating efficiency must be greatly improved if, as Mr. Loree estimates, the railways are to handle with existing facilities a traffic 15 per cent larger than that of 1920. They can be sufficiently improved only by getting the co-operation of shippers in loading cars heavily, by keeping every serviceable car moving, by increasing average train loads, and by increasing the average mileage made by locomotives.

One of the most encouraging aspects of the situation is that all the railways that are financially able to do so are planning to make large expenditures for additions and betterments and for equipment in 1923. There is no doubt that with their existing equipment in good condition the railways could handle a substantially larger amount of freight than they did in the last four months of last year, in spite of the fact that the carloadings in those months broke all records. New equipment being delivered and the improvements being made and planned for will further increase their capacity. But in periods of business revival there always has been a large increase in the traffic offered, and it seems probable that if general business is as active throughout 1923 as most business men now think it will be, there will be a chronic shortage of transportation, even though the amount of service rendered is larger than ever.

Railways and Public Opinion in the New Year

THE most important and valuable resolution with which railway officers could begin their work in the new year would be a resolution to do all the work and spend in legitimate ways all the money necessary to create and maintain an intelligent and fair public sentiment regarding railroad regulation.

There have been mistakes and abuses in the management of the railroads in the past. Mistakes are still being made, and abuses still exist. On the whole, however, the physical properties have been developed and operated more skilfully and efficiently than those of any other railways in the world. But in one respect, at least, the managements of our railroads have made a great failure and are still making a failure. They have failed and are still failing to adopt and carry out policies essential to creating and maintaining a sound public opinion.

The national political campaign and election of the year just ended registered as significantly and conclusively as any development could the failure of the railroad managements to deal successfully with public sentiment. The railways in November, in view of the difficulties under which they were operating, were giving as fine a demonstration of efficient management and operation of the physical properties as they ever did in their history. Nevertheless in that very month the people in many states, and especially in the west, went to the polls and voted a condemnation of railroad management

and of the only really constructive legislation for the regulation of railways ever passed.

The experience of the railways in the last fifteen years should be sufficient to convince every railway officer that however able and efficient their management and operation may be in other respects, it will not and cannot achieve satisfactory results for the owners of railway securities or the public unless and until railway officers develop and use as much courage, intelligence and sagacity in solving the problems presented by the relations of the railways with the public as in solving their other problems.

The history of the dealings of American railways with public sentiment is a strange story. The mistakes of omission and commission made by those responsible for their management up to about fifteen years ago present a remarkable contrast to the mistakes with respect to the same matter that have been made by those who have been responsible for their management within recent years. It is not pleasant to recall past evil practices which every railway officer would like to have buried in oblivion, but it can do no harm to recall them since the public has not forgotten them, and since drawing the contrast between what was done then and what has been done or not done recently helps to make clear the reasons why there exists today in a large part of the country a public sentiment regarding the railways which is a serious menace to the railways and the nation.

It is a matter of common knowledge that up to about fifteen years ago the managements of many railways showed an energy, courage, audacity and recklessness of expenditure in using illegitimate, indefensible methods for "educating" public officials and the public that have never been surpassed. They paid large salaries to professional lobbyists whose duties consisted chiefly of influencing politicians of all ranks and parties. The men they thus employed swarmed in every state capital and in Washington; they used whatever methods were necessary to control political conventions, legislatures and Congress; they spent money lavishly, and very often were not required to account for the way they spent it.

The railroads supplemented their use of lobbyists by lavish distribution of free transportation where it would do the most good. Every politician rode on it. They "exchanged" transportation for newspaper advertising, but the amount of transportation a newspaper received depended much more on its influence than on the space it gave to railroad advertising. There were cases where railroads spent large sums of money in "influencing" newspapers that never passed through the advertising departments of either the railroads or the newspapers.

We could paint more details into the picture, but there it is in outline. In those "good old days" many railway managements saw clearly the desirability of employing special officers to handle their public relations, and they were not so timid or economical that they would not spend not merely thousands but millions of dollars to make the work of these men effective. They showed great courage in doing public relations work as long as the methods used were scandalous and even immoral.

Then, about fifteen years ago, the awakened and indignant conscience of the American people made ineffective the methods previously used. The railroads reformed. They were glad to reform. They had been more sinned against than sinning. The money they had spent corruptly had represented blackmail even more than bribery.

But the railroads still had to deal with public men and the public. It should have been clear to every railway officer that new methods of educating public men and the public regarding railway matters should be adopted; that these should be absolutely open and honest methods, but that they should be used with just as much energy, courage and audacity as the old illegitimate methods had been. There should have been no hesitation about making whatever expenditure was necessary to get the facts about the railroad business before all the people of the country in a form that they could understand.

Here, however, is what most railways have done and failed to do recently. Most of them have not employed or developed able men to take the places of the old lobbyists and to present their case constantly and in an intelligible way to public men and the public. Railway managements have been attacked all over the country for almost every crime in the decalogue and many not mentioned in it; and in at least nine cases out of ten the attacks have gone unanswered. For two years the Transportation Act, the most constructive piece of railway legislation in history, has been constantly attacked in private and in public by literally millions of people, and

members of Congress have been denounced for having voted for it and many, in consequence, have lost their political lives. The railways in most parts of the country have done little to defend the Transportation Act from these attacks. They have grown so desperately afraid of being accused of "going into politics" that they have not even defended themselves when they themselves have been a paramount political issue.

There is no form of salesmanship more legitimate or widely used than advertising in newspapers and magazines. The railways for purely business reasons ought to be among the largest advertisers in the United States. How could it fail to be obvious to anybody that when the exchange of transportation for advertising was virtually stopped the railways should have largely increased their cash expenditures for advertising? They should have done this, not in the slightest degree as a means of corrupting the press, but as one of the best available means of creating an intelligent public sentiment. They should have used advertising to tell the public what the railroads had done to help develop the country and the good features of their service. They should have used it to make people want to take pleasure trips in trains instead of in automobiles. They should have used it to answer unfair attacks upon them and to advocate sound legislation. On the contrary, during the very years when they should have been using advertising more extensively than ever before they have been spending less money for advertising than they have in many years.

Repeatedly one has heard the fear expressed by railway officers that if the railways should spend a substantial amount of money for public relations advertising and for doing other public relations work they would be "criticised." Here is an industry whose managements have been accused of more offenses against morals and the public weal than the management of any other industry ever was, and yet which has been afraid to spend enough money in legitimate ways to defend itself lest it might be "criticised." How, in Heaven's name, could it have been criticized any more than it has been?

Those responsible for the management of the railways up to about fifteen years ago almost brought ruin upon them by being energetic, courageous, audacious and extravagant in the use of illegitimate and even dishonest methods for influencing public opinion and legislation.

Is the generation which succeeded to the responsibility of managing them going to complete their ruin by being indolent, timid, inert and penurious in the use of legitimate and honest methods for influencing public opinion and legislation?

We have feared so in the past, but this fear is being dispelled. Numerous evidences recently have been afforded that railway officers generally are awakening to the fact that it is just as much their responsibility and duty to do everything that is necessary to create a sound public opinion regarding railway matters in their own territories as to develop and operate the properties with the greatest practicable foresight, energy and efficiency.

The *Railway Age* has ventured within the last year to offer many suggestions regarding what should be done by the railways to increase public knowledge and improve public sentiment regarding railway matters. We venture again, at the

opening of the new year, to offer some suggestions as to what every railway ought to do.

First, put an able and high salaried man, with rank not less than that of assistant to the president, in general charge of public relations work, and enable him to devote all his time to it. All officers of the railroad should participate more or less in this work, but it will never be well done until it is specifically made the duty of certain officers to see that it is done. The officer in charge of public relations should advise the other officers regarding these matters. He should be a man who could represent the railroad creditably and effectively in the most important conferences and discussions regarding public railway relations matters.

Second, closer contact should be maintained between all the general and divisional officers and the public than is the case on most railroads. These officers should frequently attend meetings of chambers of commerce, farmers' organizations, etc.; participate in their work, and discuss transportation matters when opportunity is afforded. The greatest danger is that the people in the smaller towns and rural communities will be neglected. In fact, this is unquestionably done on most railroads, and it is in these small cities and rural communities, especially among the farmers, that there is the most misunderstanding and adverse sentiment.

Third, a great deal of missionary work needs to be done among employees. Their minds have been perverted by labor union propaganda. They disseminate this propaganda among all the people they come in contact with. This is the means by which a very large part of the present hostile sentiment has been created within the last two years. More facts to refute charges made against the railways should be presented to employees and more supervision should be exercised over, and more educational work done among them to cause ticket agents, train service employees, and others who come in contact with the public to treat the public well.

Fourth, prompt and vigorous answer should be made in the name of appropriate officers of the railway to every misrepresentation of railways made in public addresses or newspapers in its territory. If the misrepresentation is made by some local newspaper, the road should be so organized that some local officer will answer it. To do this constantly and effectively would require a very great deal of work. The amount of work done by the railroads in defending themselves should be in direct proportion to the amount of energy

expended by those who make unfair attacks upon them.

Fifth, space on menu cards, on the walls of stations, etc., should be utilized to present to travellers and others facts about the railroads, and especially about the individual railroad; to set forth the part railroads play in serving the public, increasing its prosperity, and contributing to its happiness. This is more important work than that of replying to misrepresentations, because it is positive rather than negative.

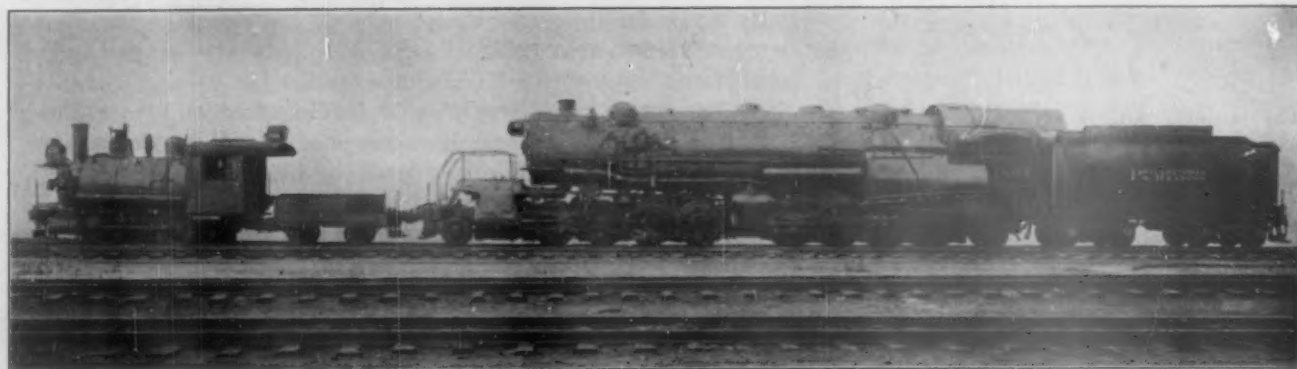
Sixth, it is imperative that the railroads do a great deal more institutional and public relations advertising in magazines and newspapers of general circulation. This is the best means available for telling the railroads' story to all classes of our immense population. One of the greatest mistakes the railroads have made within recent years has been in not doing more of this kind of advertising.

Seventh, each railroad, through its officers, and especially the man who should be in general charge of its public relations work, should keep in close and constant contact with the editors of the newspapers in its territory by personal calls upon them. This is especially true with respect to the editors of papers in the small cities and country towns.

Eighth, more information regarding and discussions of railway matters should be sent to the stockholders of each railroad in annual reports and otherwise. A stockholder, no matter how small, will read and be influenced by information and discussions regarding railroad matters sent to him by the railroad in which he owns stock. Stockholders should be urged carefully to read and assimilate what is sent to them, and use it in talking with persons with whom they come in contact.

Ninth, close contact should be maintained by the officers of each railroad with public men in its territory. Railroad propaganda material should not be forced upon them, but every scrap of information they desire should be furnished to them. Many public men advocate unsound regulation because they are uninformed.

Doubtless others can offer a better program than the foregoing. We shall be glad to receive and endorse any and every constructive criticism or suggestion that may be offered. One thing, however, is certain and this is that if the railways are to be enabled to prosper reasonably, and private ownership is to be maintained, they must attack the problem of public relations in new ways and with far greater energy and persistence than they have in the past.



The Smallest and Largest Locomotives in Service on the P. & R.

Railway Executives Expect Large Traffic in 1923

Business Handled, Net Return and Expenditures for Improvements Will Increase If Strikes or Regulation Do Not Prevent

The *Railway Age* asked a number of railway executives to contribute to its present issue their views upon the following points:

- "1. Prospects of railroad traffic in 1923.
- "2. Probable ability of railways to handle traffic satisfactorily if it continues to be heavy.
- "3. Probable trend upward or downward of net return earned.
- "4. Prospects for increases of railway facilities.
- "5. Extent to which your views regarding the foregoing are affected by apparent present attitude of the public and public officials toward the railways."

The accompanying articles, except that of President Rea

of the Pennsylvania, were prepared in response to this request. It will be noted that the writers are practically unanimous in expressing the expectation that—

1. Traffic will increase.
2. The railways will be able to handle a substantially larger business than heretofore.
3. The net return earned will increase.
4. Expenditures for increasing railway facilities will be relatively large.
5. But the net return earned, and the volume of expenditures made to increase the capacity of the railroads will depend largely upon public sentiment and government regulation.

Increase in Facilities May Be Greatest Since Before War

By W. B. Storey

President, Atchison, Topeka & Santa Fe

(1) The year 1923 seems to promise a large volume of both freight and passenger traffic—much larger than 1922 for the first half year, with the last half of the year depending upon the outcome of crops and upon business conditions at that time.

(2) The railways are able today to handle a larger volume of traffic than ever before in their history, but in my opinion when the peak of the year comes they will be unable to handle it any better than has been done this year owing to the lack of equipment and other facilities which they will not be able to provide.

(3) The larger volume of traffic ought to mean an increase in net earnings, but the freight rate reductions which have

been made will probably very largely offset this advantage so that there is not likely to be much increase in net earnings.

(4) There will be a very substantial increase in railroad facilities in 1923, probably a greater increase than for any year since before the war, but not enough to supply the deficiency caused by several years' stoppage of growth.

(5) In formulating my views I have not taken into account possible legislation affecting the railroads, although I realize that harmful legislation could easily and entirely alter the prospects. It is so manifest that good transportation is the life blood of the business of our country that I have faith that our law-makers will not suffer it to be restricted or impaired.

Conditions Necessary to Improved Transportation

By A. H. Smith

President, New York Central Lines

The business outlook seems to bid fair to continue, for a while at least, the activity which we witnessed for the past few months.

An acute car shortage is likely to develop any time when under conditions of business activity all the shippers want to forward freight at once. If you have a coal strike that retards the accumulation of the winter's supply of coal at points of consumption and this strike continues until the fall or winter, there is no method known by which a "car shortage" can be avoided on the resumption of mine opera-

tions. The country could hardly afford to have railroad facilities and equipment enough so that all the coal required for a winter's supply could be loaded and shipped in a month.

Again, there are times when fruit crops are desired to be shipped in such short space of time that it seems almost impracticable to get together enough refrigerator cars to satisfy the demand. These seasonal demands are factors that ought carefully to be weighed in connection with all views that are advanced with reference to the solution of the

so-called "car service" problem of the country. Take, for instance, the fruit growing industry. More and more the producers have sensed the matter and have organized and built warehouse facilities so that the forwarding of the crop can be spread over such a period of time as to achieve primarily a more advantageous marketing of the crops and secondarily, of course, a more advantageous and reasonable use of the transportation facilities. It would seem to follow logically that a reasonable and continuous use of transportation facilities rather than a "feast and famine" method of using them will result in improved service and reduced cost.

There can never be an adequate car supply for the benefit of the country as a whole until the parts are not deficient in themselves, and I know of no way whereby this deficiency in parts can be remedied except by pointing out to each part in principle what its equipment ownership should be. When this is done, I believe the railroads will have a mark set to which they will conform. When this is a fact there will be little difficulty, under the interchange rules which we now have, or substantially so, in rendering greatly improved service both in character and volume throughout the country.

Many roads have normal shop forces and are making substantial progress to overcome the effect of the strike. Steps were on foot before the strike which meant the liquidation of deferred equipment maintenance, and where the shop forces have resumed anything like normal activities the progress towards suitable condition of the equipment is substantial. This ought, with no extraneous interference and with contentment on the part of the forces, to achieve satisfactory results during the year.

The physical condition of the railroads at the present time can perhaps be described by the expression "getting better." It is probable that the physical condition of the

railroads was never ideal; it is probable that it has been unsatisfactory during recent years; but this has been realized by most, if not all, of the railroad managements, and such steps as their means offered and as the state of the country permitted have been actively pursued to retrieve the fact. With a fair show it should not take the railroads any longer to get back to normal than any other industry in the country.

Of course it must be realized that laws and regulations applicable to the railroad business are now virtually a harness, whether it was the intention or not, so that there is not scope, as regards available means and resources, to the railroad managements anything like that which pertains and is available, perhaps, to those forms of industry in the country which have more freedom of action, and whose business is still responsive to its own autonomous control.

In the interest of the users of the railroads it is most desirable that they shall be free from additional legislation and other interferences. What they need is co-operation, both from the branches of government that have to do with them and from the public, as well as among themselves.

We cannot hope to be wholly free at any time from a discussion of rates and wages. Fluctuations in business tend to ease one and aggravate the other, or vice versa. A contented, orderly, busy state of the country, free from agitation for political or constitutional changes, should perhaps result in a more even tenor of the conduct of each constituent industry in the country, and perhaps best promote the individual prosperity and happiness of all its citizens. If such sentiments pervade the minds of a large number of people in the country, this ought to be a good year, accompanied by an improvement in the physical condition of railway properties and in the efficiency of their service to the public.

Future Depends Largely on Regulation

By J. Kruttschnitt

Chairman, Southern Pacific Company

1. The prospects for bounteous crops and heavy traffic in the territory served by our lines are excellent for the coming year.

2. The condition of locomotives and freight cars on our lines is now almost normal, and unless something unforeseen should happen should be absolutely so within 30 days. The condition of equipment on all roads is approaching normality, and, judging by what the roads, crippled as they have been by strike conditions and failure of the Federal Railroad Administration to maintain equipment, have done this year, they should by intensive operation be able to handle traffic satisfactorily if it should be as heavy as now, or even considerably heavier.

To insure good service the railroads require and earnestly ask the co-operation of the public to equalize as far as possible their calls on the railroads throughout the year by the creation of adequate storage facilities, replenishing stocks of materials in slack times, by loading cars to their marked capacity, and by reducing delays by prompt loading and

unloading. The maximum car shortage in 1922 was 175,000, equivalent to about one day's loading, when a million cars a week are loaded. This delay occurred at the peak of business activity only and would not seem to justify grave apprehensions for the future.

3. The trend of net income depends on so many factors entirely beyond the control of the railroads as to make estimates worthless. As net income is the spread between earnings, which are controlled by government agencies, and expenses, controlled to the extent of 50 or 60 per cent by government agencies, it necessarily depends upon the acts of these agencies. Under political pressure no one can foretell what they will be. For example, notwithstanding the annual net operating income of the railroads for five years, beginning with 1918, has averaged only 2.6 per cent on their investment in road and equipment, or less than one-half of a reasonable return as fixed by the Interstate Commerce Commission, a heavy reduction in freight rates was made on July 1, 1922, in response to popular clamor, which reduced the very in-

adequate 4.4 per cent net operating income for the first six months of 1922 to less than 4 per cent for the first nine months.

4. Notwithstanding inadequate income, the railroads have shown a commendable sense of their public obligations by the large equipment orders placed. The ability of the railroads to transport freight has always exceeded their ability to deliver it. In addition to delivery tracks at stations, there are thousands of spur and industrial tracks, the capacity of which is no greater today than it was years ago when traffic was but a fraction of what it now is. If these facilities were

increased quite generally it would make a wonderful difference in speed of delivery. The congestion at seaports is in staple articles for export, and as long as it is found cheaper to use freight cars as warehouses than to provide storage for freight pending the arrival of ships, cars will not be emptied for additional loads and congestion will be inevitable.

5. What I have said about the probable trend of net return shows my views are very much affected by the present attitude of the public reflected in bills already and about to be introduced by congressmen who but recently have been in close touch with their constituents.

Railroads Can Handle 15 Per Cent More Traffic Than in 1920

By L. F. Loree

President, Delaware & Hudson Company

1. While the future seems very uncertain my guess is that we will continue to be offered a heavy business until about May 1. The balance of the year I think will be quite light.

2. I think the roads have the facilities to handle a business at least 15 per cent larger than that handled in 1920. The shippers need to increase their facilities about 50 per cent.

3. I see no reason to believe that the operating ratio can be substantially changed in view of the present stabilization

of wages and cost of coal. That being the case the net would vary directly with the gross.

4. Until railway credit improves there is not likely to be much increase in railway facilities.

5. In reaching these conclusions I have not taken into consideration the present attitude of the public and public officials toward the railways. This does not seem to be likely to improve in the immediate future, and especially is this true as to the attitude of public officials.

Net Return Should Show Increase

By Ralph Budd

President, Great Northern

1. The prospects for railroad traffic in 1923 appear to indicate a considerable increase over 1922.

2. The railroads of the country are able to handle much more traffic than was handled in 1922 provided they are not required to handle so much of it in a comparatively short period, as was the case in 1922, and provided their service is not interfered with or interrupted by strikes.

3. Net railway operating income should show an increase

because the net results in 1922 were affected so adversely by such unusual conditions.

4. The indications are that railway facilities will be increased quite extensively during 1923, particularly by the purchase of new equipment.

5. The above bears in mind the threatened action by certain members of Congress, but is premised upon a continuation of practically the present rates and wages.

Shortage of Transportation Causes Heavy Losses to Public

By E. J. Pearson

President, New York, New Haven & Hartford

1. Assuming a satisfactory solution of the large national and international problems now confronting commerce, industry and finance, the trend of the general business situation indicates a moderate increase in railroad traffic during 1923. The violent ebb and flow of business during the three years preceding 1922, the coal miners' strike and the shop crafts' strike during the year now closing, have combined to prevent a permanent return of business to a normal level. Such a

level should be approximated and perhaps reached in 1923, but the basis will be higher.

2. If shippers will be alert during periods of lighter traffic to employ the surplus transportation capacity then available, the railways will be able, but under gradually increasing pressure, to handle the traffic likely to offer during the coming year.

In particular, the proper realignment of the movements of

coal as compared to the disarranged situation during the miners' strike, the gradual improvement in condition of railroad power which was reduced to a condition averaging below normal during the shopmen's strike, and the considerable amount of new equipment recently contracted, will together improve both performance and capacity in 1923 as compared to 1922.

But notwithstanding this prospect, it would be well for the public to realize that their interest in transportation capacity is greater and more vital than that of the regulated managements of the railroads. The public should be made to see that unless the public control of railroads is on such a fair and constructive basis that railroad credit is established, making further expansion of the railroad properties possible, the aggregate losses to commerce and industry from transportation deficiencies in the near future, if indeed they are not now at hand, will be far in excess of the amounts of added revenues needed to establish the credit needed in order to make those constant additions to cars, locomotives, and the physical property of the carriers, which would solve the so-called transportation problem. From the public point of view, there is the practical question if the time is not here when it is to their interest to pay a dollar more in revenue so the carriers' financial health and strength may be established and with a return of three dollars to the public on their investment because of increased capacity and better service. Is not the public overlooking the opportunity of a possible 300 per cent investment for its own direct advantage

and, instead, is it not contributing through increasing pressure against the railroads, to a curtailment of transportation capacity that in the end will restrict the capacity volume of its commerce?

3. The trend of the net return earned by the railways promises to be slightly upward, based on the continuation of the more recently established levels of revenues, expenses, and the hoped-for future avoidance of labor troubles not only on the railroads but in connection with products, the cost of which represent such a large portion of railroad operating expenses.

4. During the year past, a few railroads have commenced to see a little financial daylight. As a result, the contracts for equipment compare favorably with those of the few preceding years, and moreover an occasional improvement of, or addition to, the physical plant has been recently reported. However, the railways as a whole are far from earning that return on their valuation which is attractive to investors, and the prospects for increase in railway facilities, therefore, is not bright except in spots that are few and far apart.

5. The more favorable prospects, gradually developing, have been dimmed quite seriously by expressions, antagonistic to railroads, made by several of those recently elected to the Congress and by the apparent intent of a number of the members to institute a policy of still further railway starvation. Any such policy will restrict credit and those who advocate it should be warned that the result will be service growing poorer and facilities growing more inadequate.

Increase of Facilities Depends on Net Earnings

By H. E. Byram

President, Chicago, Milwaukee & St. Paul

1. I think the outlook for a good volume of railroad traffic for 1923 is promising, especially in the western territory, where large crops were produced in 1922, and the movement of these crops and materials, supplies and manufactured articles which will be returned to the country in which the grain was grown, and the limited amount of coal on hand, seem to indicate that at least for several months there will be a fairly heavy traffic for the railroads to handle.

2. I do not think the railroads will have any difficulty in handling the traffic so far as the amount of equipment available will permit, but, of course, there is a very serious shortage of equipment, which is the result of the inability of the railroads, during the past few years, to command the credit necessary to provide it, with the inevitable result that when business assumes normal proportions as it has during the past few months the inadequate amount of equipment available for moving it is pronounced and brings losses upon the shippers as well as the railroads.

3. It is very difficult to make any prediction as to the trend of net earnings of the railroads. That will depend entirely upon whether the efforts that are now being made to still further reduce the freight rates will be successful. Also whether the present volume of traffic can be maintained and increased. We have not yet had enough experience with

the new rates established last summer by the Interstate Commerce Commission and the scale of wages for railroad employees, established about the same time by the Railroad Labor Board. These two factors when combined with a period of normal volume of traffic extending over a period of perhaps a year will give some definite idea as to what result the railroads may be expected to bring about under new conditions, but at the present time there has not been enough opportunity to develop substantial information on the subject to make a reliable prediction.

4. The prospect for increase in railway facilities is largely dependent upon the net earnings of the railroads because in order to make improvements large amounts of capital must be borrowed and that capital can be made available only at reasonable prices when the earnings of the railroads are sufficient to satisfy the lender that his investment would be safe if loaned to the railroads for making increased facilities. There is no doubt that increased facilities, especially equipment, yard and shop facilities, etc., are greatly needed in order to keep up with the increasing requirements of the traffic of the country.

5. The entire railroad situation, and in fact the successful handling of the transportation problems of the country, depend upon the attitude of the public through the recognized

public authorities who have control over them. The increasing control of governmental bodies over the vital features of railroad operation has so shaped the situation that conditions prevailing now are almost the same as under government ownership, with the exception that the government is not

responsible for the financial results. Certainly the railroads are not in any condition to permit of further reductions in their revenues which are now being vigorously prosecuted by the railroad commissions of ten western states before the Interstate Commerce Commission.

Much Larger Traffic Expected in 1923

By J. M. Kurn

President, St. Louis-San Francisco

1. Present indications are that railroad traffic in 1923 will be much heavier than in 1922.

2. With the new freight and passenger cars ordered, as well as the new locomotives, delivery of which will commence in January, and the large number of freight cars that we are rebuilding, together with the heavy program of repair work to our present power, we feel that this company will be in

good condition to handle the increased traffic expected in 1923.

3. I look for an increase in net earnings.

4. This company anticipates building of double track, reduction of grades, extension of shops and roundhouses, additional shop machinery and tools, and other needed improvements, amounting to approximately seven million dollars.

Either Adequate Rates or Inadequate Service

By E. E. Loomis

President, Lehigh Valley

Making it possible for the railroads to earn revenues sufficient to insure this country a prompt and efficient transportation service, in my judgment, is today the most important item in our whole national business problem. Its importance is by no means confined to the railroad companies. The nation's farmers, manufacturers and business men generally bid fair to suffer far more than anyone else in the long run, through a deterioration of transportation.

The railroads had a difficult time in 1922. Coal and shop-craft strikes laid a heavy hand upon their incomes and later, when business offered in great quantities, shortages of cars and power served to keep down earnings when they were most needed. When business began to move in volume the effects of the 10 per cent freight rate reduction made last spring began to reveal themselves.

Those most urgently seeking the lower freight rates freely prophesied that they would bring lower prices for the materials used by the railroads and, in view of the general trend, it was contended that wages paid railroad labor faced a big deflation. This combination of circumstances it was pointed out, undoubtedly, would lead to a considerable cut in operating costs.

In no sense did these predictions come true. Practically without exception every important commodity bought by the railroads is higher today than it was a year ago. As for coal, one of the most important items entering into railroad operations, the *Railway Age* is authority for the statement that latest available figures show that its average price for all railroads is 40 per cent greater than before the strike. This increase alone means some \$17,500,000 added to the operating cost of railroads every month. What has happened with regard to labor costs is all too well known.

Apparently there is little disposition to consider these

things. Despite the fact that the railroads as a whole will hardly earn 4 per cent on their investment, there is widespread demand for another freight rate reduction, particularly on farm products, and it is urged by some that this is absolutely necessary if the farmer is to be saved from economic disaster.

James R. Howard, president of the American Farm Bureau Federation, is credited with saying that the average annual expenditures of a farmer for freight transportation amount to only 8 per cent of his total expenses, although one would imagine, from the wealth of arguments offered on the subject, it was the most important item in his budget. It is difficult to believe that any particular improvement in the farmer's financial status will follow a change affecting such a small part of his annual outlay.

The farmers' problem after all, as I see it, is one of merchandising rather than freight rates. As has been said, his freight payments to the railroads are only a trifling portion of his total expenditures and, heretofore, the reductions in those charges sooner or later have been absorbed by those who buy his products.

As it is, the farmers, in striving for whatever temporary gain they may make by a freight rate reduction are endangering one of the most important elements in their financial success. It does them no good to grow apples or wheat or any other commodity if, at the time the commodity should be marketed, transportation is not available.

The immediate railroad problem, in my judgment, offers two alternatives. Either the transportation companies are going to be permitted to earn a fair return and give adequate service, or American business and agriculture, in insisting upon lower rates, must be willing to accept a service which will by no means meet their demands.

Attitude of Public Will Influence Expenditures

By C. E. Schaff

President, Missouri, Kansas & Texas

1. There are so many phases of this subject which are difficult to correctly anticipate that forecasts are necessarily hazardous and suggest caution against over-optimism. However, conditions at the close of 1922 are encouraging and warrant expectation of at least a moderate increase in traffic volume during the coming year.

2. Conditions, generally speaking, and particularly in the southwest, are improved, and with a normal agricultural production, no doubt, there will be continued improvement. In order to assure continued improvement, however, it is necessary that business generally shall enjoy freedom from such occurrences as were experienced in 1922; notably the mine and railroad strikes. A satisfactory adjustment of the international situation will doubtless have a beneficial influence also. Unless there is a very great increase in the volume of traffic offered for movement, the carriers, with the additional power and equipment which has been, and is being, provided, will be able to handle it with a reasonable degree of satisfaction.

3. The railroads have purchased new equipment and locomotives, and improved and augmented their facilities during the past year, and the benefits to be derived from these

additions and improvements have not yet been fully experienced. In all probability this policy of expansion will be adhered to in the coming year to the full extent warranted by the financial circumstances of the roads, and the demands for transportation service.

4. The attitude of the public, public officials and regulating bodies will, of course, have a marked influence upon the financial condition of the railroads, and the result of this influence will in turn have great bearing upon the expenditures to be made for additions and betterments. At the present time, unfortunately, there is an influential element in public life whose attitude is not encouraging.

5. The constructive tendency recently displayed by the Interstate Commerce Commission as to the certain effect of drastic rate action upon the railroads' revenues, if accepted as a criterion of its future policy, is indicative of better net returns, and, if such a policy is followed, will no doubt be productive of some profit, and an improvement in the credit position. However, forecasts in this respect are uncertain, as results are governed largely by what may, or may not, be done by the Congress, the Railroad Labor Board, as well as by the Interstate Commerce Commission.

Future Depends on Fair Trial of Transportation Act

By J. H. Hustis

President, Boston & Maine

1. Traffic probably will be larger than for 1922.
2. Railways will be able to handle traffic better than in 1922.
3. We hope the trend of net return will be upward, the extent depending on correct answer to question 5.

4. Prospects are for increases of railway facilities only for existing needs.

5. If the Transportation Act is to be given a fair trial, there is hope as to the future. If it is not to be given a fair trial, then no one can reliably predict what is ahead.

Co-operation of Public in Handling Traffic Needed

By W. R. Scott

President, Southern Pacific Lines

1. The railroad traffic of 1923 should fully equal that of 1922, predicated on suitable weather conditions for crops. 1922 prices for farm products generally have been such as to stimulate further production and, for that reason, I believe there will be a considerable increase in acreage planted. Should foreign demand improve, crops should bring fair prices and stimulate railroad travel.

2. Railroads are rapidly recovering from the strain put upon them by the coal miners' strike and the shop men's strike and the repair of present locomotives and equipment, restoring same to normal conditions, together with new equipment ordered, will enable the railroads to handle traffic

in satisfactory manner, particularly if they receive the co-operation of the shipper in utilizing equipment to as full a capacity as possible and prompt loading and release of cars.

3. With present rates, there will probably be a slight upward trend in the net returns earned provided the business of the country moves in normal manner and is not interrupted by strikes involving either production or transportation.

4. Many railroads have made provision for increased railway facilities to care for prospective increases in business and to in part make good the deficiency of facilities provided since the entrance into the World's War.

5. All of this may be affected favorably or adversely by

the attitude of the public and public officials towards the railways. If the present Transportation Act is given a few years' trial, a much better opinion can be formed on which to base judgment regarding any change therein. I believe the public generally recognize the present needs of the rail-

roads but if its opinion is swayed by appeals to prejudice on the part of public officials, the transportation machine on which the whole development of the country depends will be unable to function properly and keep pace with the growing demands of our country.

Railroads Face Unprecedented Difficulties*

By Samuel Rea

President, Pennsylvania System.

The railroads of the United States, in the closing quarter of the present eventful year, face an array of unusual and in some respects unprecedented difficulties. It is extremely important that the facts of the situation be thoroughly grasped by shippers, travelers, and the public generally.

Since the close of 1921 there has been a reversal of business conditions in America, and with all the hard knocks it is a change for the better. From extreme dullness we have rapidly advanced to a point where railroad traffic is close to record levels.

I think the public should bear in mind that the necessity of handling an extremely fluctuating volume of traffic imposes upon our railroads practical difficulties of a character which most other forms of business do not feel in anything like equal degree. The capacity of a railroad, *i. e.*, its tracks, yards, stations, cars and locomotives, and those of the systems with which it connects, must, in order to avoid long periods of congestion, be fairly adequate for the handling of peak traffic, although "peaks" are of brief duration and occur only for a short period in each year.

Manufacturing industries are, of course, subject to "peaks" and depressions, but the manufacturers can anticipate the future or close down for a time if the interests of the business so require. A railroad, however, cannot shut down, nor can transportation be manufactured in advance. A railroad company must accept traffic and should be able to perform the service immediately when offered, or, practically, it fails to function.

Some idea of what these violent swings mean may be gained from the fact that in the last nine months alone the number of loaded freight cars handled per week on the Pennsylvania Railroad System has been as low as 96,000 and as high as 180,000. In the week ended November 4, the Pennsylvania Railroad System moved nearly 19 per cent more loaded cars than in 1921, and 11 per cent over 1920, so you see we are alive to the situation because this has been accomplished without any material increase of equipment or facilities.

But it is inevitable that the railroads now have more traffic offered to them than their available facilities can handle in the normal way, and with reasonable promptness. The situation, present and prospective, as between the railroads and patrons, is one that calls in the highest degree for mutual understanding, patience, tact and helpfulness. The co-operation of patrons in such matters as the prompt loading

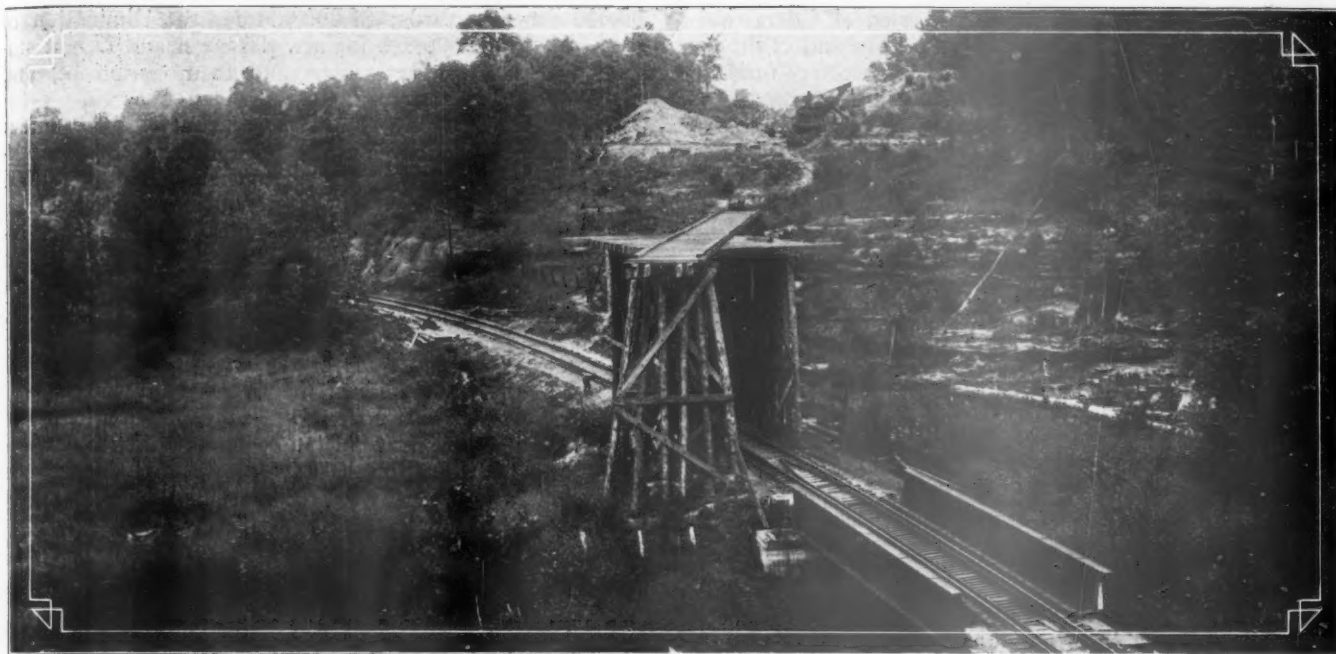
and unloading of all cars, and the loading of all cars, as far as possible, to maximum capacity—practices which have been so helpful in past emergencies—are now urgently required.

With these aids, upon which the railroad executives confidently count, I hope it will be possible during this critical period to measurably furnish the country with its necessary transportation and avoid long congestion and confusion. Such congestions or so-called "car shortages" are costly to our people.

But you will ask, is there no remedy for this situation? Must the railroad investors, the business men, the farmers and the country suffer this condition to continue and concur in the gradual paralysis of their own business and individual initiative? What will mitigate the burden and enable the country gradually to work back again to ample transportation service? Just begin by telling your state and national representatives and senators to stop tinkering with the railroads, as they will not be saved by legislation, but by freedom to manage their properties under minimum reasonable regulation and to earn a fair return. If they fail to earn it business is hurt and business costs and living costs are increased.

The directors of the Pennsylvania Railroad Company have never wavered in their belief that public opinion is back of a square deal for the railroads, and notwithstanding the discouragement given to railroad investors we are putting forth every effort to avoid blockades and under the gravest drawbacks of the last two years we have undertaken the construction of 100 new freight locomotives, 15 new passenger locomotives, and 100 of the latest type cabin cars; and the conversion of a very large number of freight cars from 50 ton to 70 ton capacity. We have actively resumed work with other railroads on the station and yard improvements in Chicago. We are completing our extension into Detroit, enlarging our freight facilities and yards near Harrisburg, South Philadelphia, Pittsburgh, Sharpsburg and Pitcairn, and laying additional tracks from Kenwood to Rochester, Pa., and at other points. We are also proceeding with yard extensions at Baltimore and Hagerstown, Md., and other improvements in practically every state in which we are operating. This improvement program is much below what we would like to do if the net earnings had justified it, but there must be a change in the net earnings, or our improvement program must be stopped. We cannot obtain new capital and we must not ask investors to entrust it to us, unless the business men, the farmers, the public and the legislative bodies of the country are going to deal justly with the railroads.

*Extracts from an address before the Commercial Club of Chicago, on November 17.



Reducing Grades in Kentucky

Railways Will Make Many Improvements in 1923

Budgets Show Appropriations for Greatly Increased Expenditures for Roadway and Equipment

By E. T. Howson

Based on returns from one-third of the mileage, the railways will spend over \$700,000,000 for improvements and additions to their plant during 1923.

In only one year of the last ten have the roads added a greater amount to their investment in road and equipment.

Budgets already made indicate an active year for railway and railway supply companies.

TWENTY-SEVEN RAILWAYS with an aggregate mileage of approximately 95,000 miles will spend over \$350,000,000 for improvements to roadway and structures and for new equipment during 1923.

If it may be assumed that an equal amount will be spent by the remaining two-thirds of the mileage of the railways of the United States and Canada, the total expenditure will exceed \$700,000,000 during 1923. The significance of this is indicated by the fact that in only one year (1917) during the last ten have the records of the Interstate Commerce Commission shown an increase in investment in road and equipment of this amount, while the average annual investment during this period has been less than \$500,000,000.

This money will go for new lines, for second track, for new yards and terminals, for freight and passenger stations, for shops and shop equipment, for signaling, for cars and locomotives and for other facilities which make up a railway property.

Large as this figure is, it includes only those expenditures which have been definitely approved. Many other projects will be undertaken during the year and their total will add much to the amount given above.

These statistics are necessarily incomplete because many roads do not prepare annual budgets, but pass upon the merits of each appropriation individually as it is presented throughout the year. Other roads have not yet completed their plans and are not in a position to give us the information concerning their proposed expenditures. Therefore, although the figures given above include only one-third of the mileage of the United States and Canada, they cover a sufficient mileage to demonstrate that 1923 will be an active year.

These figures indicate that the railways are taking measures to bring their facilities up to the demands which are now being made on them. The traffic of recent weeks has demonstrated the inadequacy of the railway plant in equipment and trackage alike. For reasons beyond their control the roads have been unable to keep pace with the industrial development of the country during the last eight or ten years until they are now in need of facilities of all kinds. The year which has just closed has witnessed a marked increase in the construction of new facilities and in the purchase of equipment. The heavy business of the closing months of 1922 and the prospects for its continuance during the year now opening, with the increased earnings which are resulting therefrom, warrant the managements in making further appropriations for needed additions to their plants.

While this awakening of activity is marked, it is not universal. In fact, the reverse is true, for while many roads have planned large problems, others have little or no work of any magnitude in prospect. In general those roads are

most active whose recovery from the period of federal control has been most rapid and whose earnings and credit are high. Through their ability to secure the necessary funds at reasonable rates they are able to finance these expenditures and their earnings warrant them in taking on the additional charges which less prosperous roads cannot venture.

The roads which have furnished information from which this analysis has been made include the following:

Ann Arbor	New York Central
Arizona Eastern	New York, Chicago & St. Louis
Atlantic Coast Line	New York, New Haven & Hartford
Atchafalaya, Topeka & Santa Fe	Norfolk & Western
Baltimore & Ohio	Pennsylvania
Central Railroad of New Jersey	Pere Marquette
Chicago Great Western	Philadelphia & Reading
Chicago, Rock Island & Pacific	St. Louis Southwestern
Delaware, Lackawanna & Western	San Antonio & Aransas Pass
Denver & Rio Grande Western	Toledo, St. Louis & Western
Great Northern	Union Pacific
Illinois Central	Western Pacific
Lehigh & New England	Wheeling & Lake Erie
Louisville & Nashville	

The Roads with the Largest Programs

Among those roads which are the most active are the New York Central Lines. During 1922 this system contracted for new cars and locomotives involving an expenditure of approximately \$54,000,000, most of which will be delivered early in 1923. It also appropriated approximately \$50,000,000 for additions and improvements to roadway and structures. Of this latter amount \$21,000,000 was expended during 1922, leaving \$29,000,000 to be carried over into 1923. This will be supplemented by additional appropriations during the year as the necessity develops.

Among the more important projects included in this program are the construction of the Hudson River Connecting Railroad near Albany, N. Y., involving about 20 miles of new double track line with a bridge across the Hudson river, and a freight classification yard at Fuera Bush; the building of a new bridge over the Niagara river at Suspension Bridge, N. Y.; the completion of the second unit of a freight terminal at Niles, Mich.; the construction of additional tracks and a new passenger station at Springfield, Mass., and the building of additional main tracks at various points on the system.

The Pennsylvania has a program of similar magnitude. Among its larger projects are the completion of its extension into Detroit, its participation in the construction of the union station at Chicago, the enlargement of freight facilities and yards near Harrisburg, South Philadelphia, Pittsburgh, Sharpsburg and Pitcairn, and the construction of new shops at Altoona and other points. The total of the expenditures which it has carried over into 1923 aggregates \$55,000,000.

Another road with a large program for 1923 is the Illinois Central, whose budget totals over \$42,000,000. Included in this is \$5,000,000 for new lines; \$4,500,000 for grade reduction and second track; \$1,300,000 for new shops and their equipment, and \$26,500,000 for new cars and locomotives.

The Louisville & Nashville also has a large program under way and in contemplation. Particularly because of the rapidly increasing development in the coal fields in eastern Kentucky, this road has authorized expenditures aggregating more than \$26,900,000 to enlarge its transportation capacity. As most of this was appropriated within the last two months of the year, approximately \$20,000,000 was carried over into 1923. Included in this work is \$3,900,000 for double track; \$3,400,000 for new bridges; \$1,900,000 for new terminal facilities; \$5,400,000 for heavier rail, shop machinery, etc., and \$12,300,000 for new cars and locomotives. In addition, numerous other large projects are in contemplation but have not progressed to the point that definite announcement can be made.

The Norfolk & Western is another road which will continue its policy of keeping its facilities in advance of the demands of its traffic by liberal expenditures. Its budget for 1923 contemplates the expenditure of over \$32,000,000 for new facilities, including \$2,500,000 for second track; \$2,-

000,000 for new yards; \$2,000,000 for the elimination of grade crossings; \$500,000 for new passenger and freight stations; \$800,000 for new shops and their equipment, and \$24,600,000 for new cars and locomotives.

Another road which has a large amount of work under way and in contemplation is the Union Pacific, whose expenditures for improvements will aggregate over \$20,000,000 in 1923. Included in this are over 60 miles of new lines which will cost over \$1,500,000; 25 miles of second track involving an expenditure of \$2,500,000; terminal facilities at several points costing over \$3,500,000; new bridges which will require the spending of over \$1,800,000, and \$5,650,000 for equipment.

Typical of the magnitude of the expenditures which are required at individual points, the Pennsylvania is engaged in a program of reconstruction in the vicinity of Pittsburgh which will extend over several years and for which it has appropriated \$8,000,000 for the first stage. Included in this is added main tracks, new locomotive facilities, the elimination of grade crossings, etc.

New Lines Will Be Built

While the railways are passing rapidly from the period of extensive development or the construction of new lines to that of intensive development involving the building of multiple main tracks, the enlargement of yards and buildings and the addition of cars and locomotives, the construction of extensions has not ceased entirely. A large part of the mileage which is added each year is built by small companies to meet local needs and is not included in this investigation.

However, the larger systems also have a considerable mileage of new lines under way or in contemplation for the immediate future. A part of this mileage will afford alternate main lines for the handling of through traffic, while other lines in contemplation are designed to develop new territories and to offer transportation facilities to districts heretofore without them.

The double-track cut-off 20 miles long which the New York Central is building near Albany, N. Y., under the name of the Hudson River Connecting Railroad, to divert freight traffic around that city is typical of improvements of the first class, as is the line which the Illinois Central plans to build from Edgewood, Ill., south to the Ohio river at Metropolis to avoid the congestion and adverse grades on its present line between Fulton, Ky., and Centralia, Ill.

Among the lines designed to develop new territory are the extension of the Union Pacific from Delta, Utah, to Fillmore, 31.4 miles, and from Lund, Utah, to Cedar City, 32 miles. The Pere Marquette also plans to build 11 miles of new line next year.

The need of additional track facilities is evidenced by the large appropriations which are being made for second track. The Atchafalaya, Topeka & Santa Fe awarded contracts late in December for the construction of 137 miles of second track between Albuquerque, N. M., and Los Angeles, Cal., involving an expenditure of more than \$7,000,000 and has other work in prospect, which work is in addition to 75 miles already well under way within these same limits and estimated to cost \$6,500,000.

The Illinois Central has appropriated \$3,213,000 for 48 miles of second track to be built in 1923; the Norfolk & Western will build 20 miles at a cost of \$2,500,000; the Union Pacific is building 27 miles in Idaho on which it will expend \$2,500,000; the Great Northern has 34 miles in contemplation for which it has appropriated \$1,775,000; the Chicago, Rock Island & Pacific plans to spend \$1,500,000 for 21 miles in Kansas, while the Atlantic Coast Line will build 45 miles.

Smaller appropriations for second track include \$375,000 for 16 miles on the Pere Marquette; \$168,000 for seven miles on the New York, Chicago & St. Louis, and \$375,000 for 4.4 miles on the Ann Arbor.

Much of this second track construction also involves the reduction of grades. Among the appropriations for this latter objective alone, the Pere Marquette will spend \$155,000 for the reduction of grades on three miles of line, while the Illinois Central has appropriated \$1,140,000 for the reduction of grade of 8.8 miles of line.

Much Money Will Be Spent for Terminal Facilities

Terminal facilities have long been regarded as the limiting factor in fixing the capacity of the railways. It is here that congestion first develops and becomes most pronounced. For this reason it is not surprising that the roads are making large appropriations for facilities of this character.

The Norfolk & Western contemplates improvements in its freight classification yards at four points, involving an expenditure of \$2,000,000.

The Illinois Central will spend \$3,475,000 for work at two points, including the completion of the large Markham yard near Chicago.

The Chicago, Rock Island & Pacific will spend \$375,000 for additions to yards; the Pere Marquette \$317,000 for improvements at two points; the Western Pacific \$467,000 for similar improvements at two points; the New York, Chicago & St. Louis will make additions at one point involving an expenditure of \$60,000 and the Lehigh & New England will spend \$12,000 at another point.

Passenger stations will also receive a large amount of attention. Work on the Chicago union station is now proceeding rapidly, while plans have progressed to the point that the first construction work will be undertaken on the Illinois Central's new passenger terminal at Chicago during 1923.

The Cleveland Union Terminal Company is also proceeding actively with the design of its station and with the acquisition of land, etc., preparatory to active construction.

The Philadelphia & Reading is pushing work actively on its new terminal at Camden, N. J., which is estimated to cost over \$3,000,000 and which is expected to be completed during the summer.

Among the stations of smaller cost which are in contemplation or under construction is a joint terminal for the Santa Fe and the Southern Pacific at Phoenix, Ariz., costing \$600,000; one for the Illinois Central costing \$336,000; one for the Florida East Coast at Daytona, Fla., costing \$102,000, and one at Kansas City, Kan., for the Kansas City Terminal Railway costing \$100,000. Many other stations have been reported, which will cost from \$10,000 to \$100,000 each.

The inadequacy of local freight facilities at many points is evidenced by the appropriations which are being made for their improvement. Among the projects which have already been authorized, the Norfolk & Western has appropriated \$300,000 for one station; the Union Pacific is spending \$600,000 at Denver, and \$95,000 at Sterling, Colo.; the Illinois Central will build a station which is estimated to cost \$188,000; the Chicago, Rock Island & Pacific has authorized one costing \$150,000; the Great Northern will spend \$123,000 at one point, while the Philadelphia & Reading will build a new freight station at Trenton, N. J., and increase its facilities at Lancaster, Pa.

Liberal Appropriations for Shop and Machine Tools

One class of facilities whose inadequacies were most evident during the heavy traffic of 1917 and again during the recent period of heavy business is that required for the maintenance and repair of locomotives and cars. This need is particularly pressing now because of the accumulation of repair work to be done. Furthermore, there is a growing realization of the necessity for securing more service from locomotives, which calls for the reduction of delays while awaiting repairs. As a result many of the railways have

placed appropriations for improvements to these facilities near the top of their budgets.

Among the first projects which the Atchison, Topeka & Santa Fe undertook following federal control was a large erecting shop at Albuquerque, N. M., which was completed during the year and which involved the expenditure of more than \$3,000,000. This road has since authorized the construction of other facilities at that point and at San Bernardino, Cal., which are now under way. The Pennsylvania announced recently that it will build two large shops at Altoona, Pa., while it also has extensive improvements of a similar character under way at other points.

Among the roads which will add to their facilities for the repair of cars, the Great Northern will expend \$152,000 for buildings at St. Cloud, Minn., and Great Falls, Mont., while the Union Pacific will add to its car shops at Pocatello, Idaho, at a cost of \$135,000.

The Union Pacific will spend \$1,750,000 at Los Angeles, while the Pere Marquette contemplates the expenditure of \$1,000,000 at Detroit. The Illinois Central has appropriated \$766,000 for additional mechanical facilities at two points, while the Great Northern will spend over \$400,000 at St. Cloud, Minn. The Norfolk & Western will spend \$500,000 for additional facilities at two points and the Chicago, Rock Island & Pacific \$250,000 at one terminal.

Other work for which appropriations have been made includes approximately \$1,000,000 on the Southern Pacific Lines for additions at Houston and Jacksonville, Tex., and LaFayette, La., and \$140,000 on the Western Pacific. The Erie will complete its erecting shop now under construction at Hornell, N. Y., and will build a new power house at Jersey City, N. J.

Closely allied with this is the provision of adequate shop tool equipment, the necessity for which is being realized to an increasing degree in recent years.

Among the appropriations for this purpose are \$536,000 on the Illinois Central; \$500,000 on the Erie; \$300,000 on the Norfolk & Western; \$194,000 on the New York, Chicago & St. Louis; \$150,000 on the Rock Island and a similar amount on the Delaware, Lackawanna & Western; \$104,000 on the St. Louis Southwestern; \$100,000 on the Pere Marquette; \$50,000 on the Denver & Salt Lake and a similar amount on the Great Northern. Other roads which will spend smaller amounts for this purpose include the Ann Arbor (\$25,000); the Chicago Great Western (\$33,000); the San Antonio & Aransas Pass (\$25,000), and the Union Pacific (\$30,000).

Automatic Train Control and Signaling

The installation of automatic train control to comply with the order of the Interstate Commerce Commission will receive the attention of the 49 roads mentioned in the order during 1923. Several roads have already undertaken installation, among which are the Pennsylvania, which has an installation under construction between Sunbury, Pa., and Lewistown, a distance of 49.4 miles, and the Chicago & North Western which is working on an installation between West Chicago, Ill., and Elgin, 12 miles.

The Chicago, Rock Island & Pacific will extend its installation from Joliet, Ill., to Rock Island, 140 miles; the New York, New Haven & Hartford will make an installation between Providence, R. I., and Auburn, 5 miles; the Atchison, Topeka & Santa Fe will make an installation between Chillicothe, Ill., and Ft. Madison, Ia., 102.8 miles, and the Central Railroad of New Jersey will make an installation of 65.9 miles.

A number of roads are also planning extensive installations of signaling itself. The largest expenditure reported for this purpose is \$777,000 for 345 miles on the Great Northern, while the Illinois Central is second with \$612,000. The Norfolk & Western will spend \$300,000; the Chicago, Rock Island & Pacific, \$230,000 (including train control); the

New York, Chicago & St. Louis, \$210,000; the Pere Marquette, \$150,000, and the Ann Arbor, \$135,000.

The Wheeling & Lake Erie will install 60 miles of signaling. The Atlantic Coast Line will install 45 miles of signals on a second track which it is building, while the Santa Fe will add signals on the 137 miles of second track in Arizona, contracts for the construction of which have been let recently and will complete the installation of signals on the 75 miles of second track now under construction in the same territory.

Miscellaneous Improvements

In addition to the specific improvements which have been enumerated above, the roads are planning to spend large amounts of money for other purposes of a miscellaneous character. Thus, the Central Railroad of New Jersey will spend \$2,500,000 for the elimination of grade crossings and the Norfolk & Western \$2,000,000 for the separation of grades in Columbus, Ohio, while the Nickel Plate has appropriated \$250,000 for work of this character in Cleveland, O., etc.

The Union Pacific has appropriated \$465,000 for a timber treating plant now under construction at The Dalles, Ore. The Baltimore & Ohio will construct a 3,000,000 bu. concrete elevator at Baltimore. The Denver & Salt Lake expects to undertake the construction of a tunnel six miles long through the continental divide in Colorado which will involve an expenditure of \$6,600,000.

The reconstruction of bridges will require a large amount of money. Among the larger projects, the Florida East Coast will spend \$1,800,000 in the reconstruction of its bridge over the St. Johns river in Florida. The Pere Marquette will spend \$695,000 in the rebuilding of its structures over the Saginaw and Black rivers in Michigan; the San Antonio & Aransas Pass will spend \$250,000 in the rebuilding of its structure over the Brazos river, while the Union Pacific will spend over \$1,800,000 for three structures, including \$1,245,000 for a bridge across the Columbia river at Kalama, Wash.

Water treating facilities have not been overlooked and liberal expenditures for this purpose are contemplated by a number of roads. Among the projects which have been mentioned specifically, the Wheeling & Lake Erie contemplates the construction of a new treating plant; the Union Pacific has increased storage facilities under construction at three different points, the appropriations for which amount to over \$250,000, and the Canadian National Western Lines have under way an extensive program of improving water service facilities, involving the construction of reservoirs and laying of pipe lines at a number of points, the expenditures for which aggregate a large sum.

In addition to the work specifically mentioned, there are many other projects which, although small in themselves, require large sums in the aggregate. Indicative of the recognition of need for such work, the Illinois Central has appropriated \$1,807,000; the New York, New Haven & Hartford, \$1,647,000; the Nickel Plate, \$1,000,000; the Western Pacific, \$1,000,000; the Chicago, Rock Island & Pacific, \$500,000, and the Cotton Belt, \$500,000.

Large sums are also required for those charges to capital account arising from the prosecution of more or less routine work, such as renewing rail, ballasting, strengthening bridges, etc. Typical of such expenditures, the Baltimore & Ohio estimates that it will be necessary to spend from \$6,000,000 to \$10,000,000 for miscellaneous improvements of this character and the Denver & Rio Grande Western has set aside \$4,000,000 out of an authorized issue of receiver's certificates of \$10,000,000 for this purpose, while the Cotton Belt has appropriated over \$1,200,000 for improvements to roadway facilities in addition to \$542,000 for the conversion of coal burning locomotives to oil burners and the provision of the necessary oil storage facilities.

Large Appropriations Being Made for Equipment

That the marked revival in the purchase of cars and locomotives which characterized the year which has just closed is not temporary, but is indicative of the intention of the railways to pursue a liberal policy in adding to their equipment as their earnings increase is evidenced by the plans which a number of roads have already made for the new year. Thus, the Illinois Central has appropriated \$9,445,000 for the purchase of 190 locomotives; the Union Pacific has set aside \$5,280,000 for 80 locomotives; the Norfolk & Western \$4,600,000 for 46 locomotives; the Central Railroad of New Jersey \$1,800,000 for 36 locomotives; the Chicago, Rock Island & Pacific \$2,600,000 for 40 locomotives; the Pere Marquette \$800,000 for 20 locomotives; the St. Louis Southwestern \$740,000 for 15; the Western Pacific \$330,000 for 6, and the San Antonio & Aransas Pass \$75,000 for 3.

Among other roads the Baltimore & Ohio will receive 50 locomotives; the Atlantic Coast Line 45; the Denver & Rio Grande Western 25, and the Nashville, Chattanooga & St. Louis 15. While much of this equipment has already been ordered, payment will be made this year and is, therefore, included in the 1923 budgets.

Similarly large expenditures are being made for the purchase of freight cars. The Norfolk & Western included in its budget \$19,000,000 for 8,000 cars; the Illinois Central \$16,323,000 for 7,700 cars; the Western Pacific \$5,275,000 for 2,000 refrigerator cars, and the Chicago, Rock Island & Pacific \$4,775,000 for 2,500; and the Union Pacific \$4,225,000 as its share of the cost of 3,000 refrigerator cars for the Pacific Fruit Express; the Atlantic Coast Line will secure 4,300 cars; the Philadelphia & Reading 3,100 cars; the Baltimore & Ohio 3,000; the Cotton Belt 1,200; the Nashville, Chattanooga & St. Louis 1,000, and the Denver & Rio Grande Western 950.

Among the appropriations for passenger cars are those of the Central Railroad of New Jersey of \$2,400,000 for 118; the Norfolk & Western \$1,000,000 for 20; the Illinois Central \$760,000 for 33 and the Chicago, Rock Island & Pacific \$950,000 for 50 cars, while the Philadelphia & Reading will buy 115; the Baltimore & Ohio 84; the Atlantic Coast Line 50, and the Nashville, Chattanooga & St. Louis 15 cars.

The above is not offered as a complete summary of the work contemplated on even the limited mileage from which reports have been received. Rather, it is offered as indicative of the plans which the roads as a whole are making as they are entering the new year. As such it demonstrates that the railways are planning more improvements than they have had in contemplation at this season in any recent year. From present indications 1923 should be an active year.

Since the above article was written information has been received from the Chesapeake & Ohio on the 1923 budget for that road. Exclusive of equipment, this road has approved a construction program which approximates in cost a total of \$12,000,000. Some of the important items which are included are as follows: A new steel coal pier at Newport News, Va., equipped with electrically operated car dumpers and other modern facilities; also a storage yard, an engine terminal and coal and ash plants, etc., cost \$3,658,000; new passing sidings and lengthening of old, \$2,652,000; additional yard and storage tracks, cost \$4,633,000. The balance is divided in expenditures running from \$80,000 to \$290,000 for improvements and betterments such as grade reduction, bridge reconstruction, new turntables, water stations, coaling stations, interlocking plants and telephone dispatching lines.

The following equipment has been ordered by the Chesapeake & Ohio, of which only a small part has been delivered: 58 locomotives, approximate cost \$4,586,000; 5,620 freight cars, approximate cost \$8,561,000 and 68 passenger cars, approximate cost \$1,444,000.

Rail Facilities Expansion Behind Traffic Growth

1922 Conditions Reflect Also Effect of Shopmen's Strike and of Excessive Number of Bad Order Cars

Prior to 1913 railway facilities were kept ahead of the volume of railway traffic. Since that time the opposite has been true with the result that in each period of peak traffic the railways have had difficulty in rendering an adequate service.

In 1922, in addition to this factor, the railways had to contend with the results of the shopmen's strike which reduced in number their available serviceable locomotives and freight cars.

These details are shown in this article by means of a statistical analysis and charts.

IN THE week ended October 21, the railroads loaded 1,033,759 cars of revenue freight. In the week ended October 28, they loaded 1,014,480. These figures did not break any records but they approximated closely the peak which was reached in the week ended October 14, 1920, of 1,018,539. The railroads found great difficulty in handling their October, 1922, business. The measure of this difficulty was indicated in a car shortage which for the period from October 23 to 30 averaged 179,239 cars, a record never before equalled in American railroad history.

When there is a car shortage it is always due to or accompanied by a slowing down of the rate of traffic movement. The 1922 October record was one of failure to render adequate transportation service and of failure to deliver freight to destination with the desired degree of promptness and efficiency. In fact, these conditions prevailed continuously throughout the last four months of the year.

Many people have tried to find an explanation of the present inability of the railroads to supply an adequate transportation service. Two important theories have been advanced. One is that present conditions reflect a retardation of railway progress of several years' duration. By retardation of progress is meant the inability of the railroads to obtain sufficient funds to add to their physical plant in sufficient extent to keep up with the demands of traffic.

Present Conditions Not Entirely Due to Strike

Another theory is that the present car shortage and the failure of the railways to render sufficient and prompt service are due mainly to the shopmen's strike which began on July 1, 1922. There is no doubt that the strike has been a very important factor. Those who blame the shopmen's strike for everything fail to recognize, however, that even had there been no shopmen's strike, conditions would have been very unsatisfactory. Similarly those who point out that the railroads suffer from a shortage of facilities in general must, also, in all fairness, concede that the shopmen's strike has interfered seriously with railway operation. The present conditions are not all temporary, and the railroads to give adequate service will have to go much further than merely the distance required to overcome finally the effect of the strike of the railway shop employees.

In the present article an attempt will be made to analyze statistically the situation as a whole, with proper reference to the important conditions which, because of their character,

may not appear in any statistical analysis. A desired feature of such an analysis is a comparison between the growth of railway traffic and the growth of railway facilities over a term of years sufficient in extent to give a true picture with special reference to conditions existing during the various periods of heaviest traffic. For this period, the years 1900 to 1921 have been taken and the attempt has been made to ascertain from the actual figures and their percentage relationship whether the railway physical plant has increased in as great a ratio as the traffic which it has been called upon to handle.

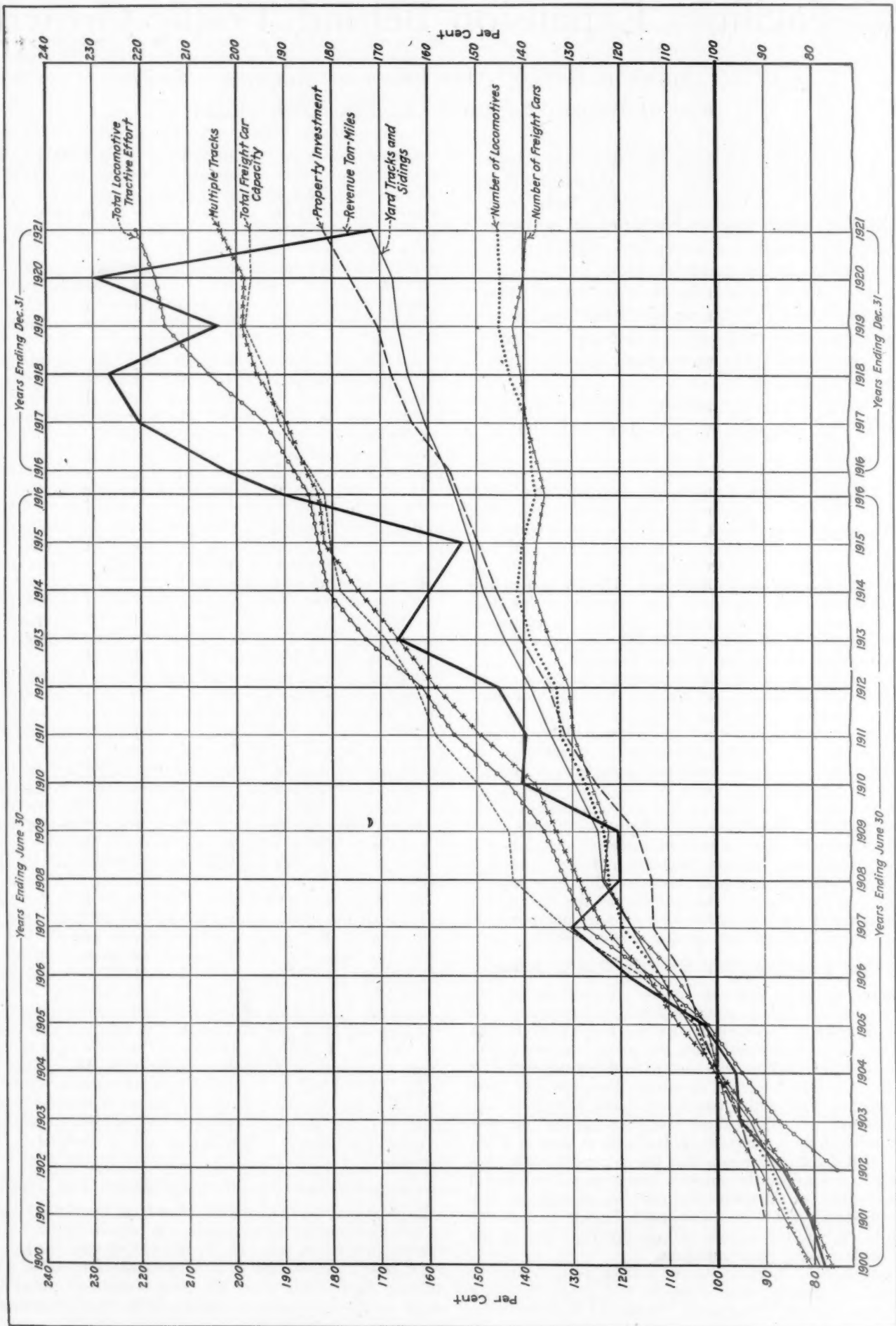
But this will not tell the complete story. We are interested in present conditions and still more interested in possible future conditions. For that reason, the analysis as above outlined will be supplemented with more detailed data for the period 1917 to date. Attention will be drawn to the several peak months which occurred during this period and there will be a comparison of the situation existing at the peak of 1922 with the peaks which occurred in 1917, in 1918 and in 1920. These figures should make it possible to distinguish how much of the present operating difficulties of the railroads are due to the shopmen's strike alone, and how much to the other underlying conditions of greater duration and of more basic character.

A study of the statistics covering the years of 1900 to 1921 plainly indicates that the traffic handled by the railways expanded in these years in considerably greater proportion than most railway facilities. One of the tables in this article gives for each of the years from 1900 to 1921 the percentage relationships for railway traffic as represented in revenue ton-miles and for railway facilities as represented in the number of locomotives, the total locomotive tractive effort, the number of freight cars, the total freight car capacity, the mileage of multiple tracks, the mileage of yard tracks and sidings and the property investment. In the compilation of the figures shown in this table the years 1902 to 1906 were averaged to give a basis of 100. The best manner of comparing the relationships between traffic and facilities is to examine the conditions in the peak years in this period.

The peak years from 1900 to date are 1907, 1910, 1913, 1916, 1918 and 1920. On the basis which we have taken as 100, namely, the average for the five-year period 1902 to 1906, it is found that in 1907 revenue ton-miles amounted to 130.38; in 1910, they were 140.52; in 1913, they amounted to 166.64; in 1918, they reached 226.90; in 1920, 229.66. Comparing these figures now with the units representing railway physical plant and equipment, it is found that the general tendency of physical expansion in the years prior to, say, about 1913, was to maintain a parity with the increase in traffic. There was a surplus of railroad capacity in 1914 and 1915, but these were years of business depression. Since about 1915, as the statistics show, the increase in railway capacity has steadily fallen behind the increase of traffic demands.

Locomotive Tractive Effort and Increase of Traffic

Locomotives: On the basis of the average for 1902 to 1906 as 100, the number of locomotives in service in 1907 was 119.44; in 1910, it was 127.11; in 1913, it was 138.55; in 1918, it was 143.04, and in 1920, 145.00. Of course, considering the fact that there has been a very substantial increase in the average train loading in this period, namely,



The Percentage Relationship of Railway Traffic and Railway Facilities on an Annual Average of 1902 to 1906, Inclusive, as a Base of 100

from 281 tons in 1901 to 647 tons in 1920, or an increase in the average tractive effort from 20,485 lb. in 1902 to 36,803 lb. in 1921, it should not properly be expected that the number of locomotives would increase in the ratio to the amount of business which these locomotives were called upon to haul. Locomotive tractive effort, however, should be expected to be maintained somewhere near a parity with increased traffic. This did, on the whole, prove to be the case until the big increase in traffic in 1916. With the locomotive tractive effort percentage on the 1902 to 1906 basis as 100, the figure was in 1907, 127.44, as compared with the revenue ton-mile figure for that year of 130.38. In 1913 the tractive effort percentage had risen to 173.00, as compared with the ton-mile figure of 166.64. In 1916 the tractive effort figure was 185, the ton-mile figure, 190.23. In 1918 the tractive effort figure was 206.00, that for ton-miles, 226.90; and in 1920, the tractive effort figure had become 217.00, as compared with the revenue ton-mile percentage of 229.66. For a period the locomotive tractive effort expanded in greater ratio than railway traffic, and then the tendency was in the opposite direction. In the chart, it will be noted that the locomotive tractive effort curve comes nearer the curve representing revenue ton-miles than the curves for any of the other units selected, but then, even so, since 1916 it has fallen behind the traffic curve.

Year	Revenue ton-miles	Number of locomotives	Total locomotive tractive effort
1902 to 1906	100	100	100
1907	130.38	119.44	127.44
1910	140.52	127.11	143.29
1913	166.64	138.55	173.00
*1916	190.23	137.71	185.00
1918	226.90	143.04	206.00
1920	229.66	145.00	217.00

*Fiscal year ended June 30.

It should be borne in mind that during the period included in this investigation important improvements in locomotives have been made which should increase the capacity per unit of tractive effort. It is quite certain that the railroads are not obtaining the full possible utilization from this improved motive power and from recent improvements in operating methods, this being due largely to inadequate terminals and shops. It will be shown below that as concerns 1922, however, an excess proportion of unserviceable locomotives has prevented the railways from utilizing the increased tractive effort which otherwise would have been available.

In dealing with railroad statistics the fact should never be overlooked that conclusions cannot be safely drawn from them unless consideration is given to all the facts relative to the conditions existing at the time to which the statistics relate. Now, the statistics given herein regarding railway traffic relate, of course, only to the traffic which the railways actually handled. The question arises, therefore, was there

any traffic offered to the railways during these years which they were unable to handle?

This is a very difficult question to answer, but certain pertinent facts can be given. In the years 1906 and 1907 there were large so-called "car shortages." Many of the best operating officers said at that time that the difficulties met by the railways in handling business were due more to inadequacy of locomotives than of cars. Whether this was true or not, it is a fact that from the time of the "car shortages" which culminated in 1907, down to 1916, the total tractive effort of locomotives in service increased more than freight ton-miles. It is also a fact that in the nine years from 1907 to 1916 there was practically no "car shortage" except late in 1912. This is pretty conclusive evidence that during this time there was no traffic available which the railways could not handle.

Beginning in 1916, however, there began to be so-called "car shortages" which lasted without intermission through 1917. The reports of the Railroad Administration indicated that there were no "car shortages" in 1918, but these reports must be regarded with some skepticism in view of two facts. One of these is that during most of that year the Railroad Administration did not give out figures. The other is that the Railroad Administration constantly handled traffic under a system of permits and embargoes. At any rate, after the lull in business in the early part of 1919, it is a fact that in the fall of that year a large "car shortage" was reported, and it continued to exist almost throughout 1920.

Is it possible to regard as without much significance the fact that during the years that locomotive tractive effort showed a relatively greater increase than ton-miles practically no "car shortages" were reported, while during most of the time since 1915, when the increases in tractive power have lagged behind increases of ton-miles, there have been "car shortages" reported? It certainly does not seem unreasonable to conclude that in a period when "car shortages" are occurring some or even much traffic is prevented from moving at all which would move if adequate means of transportation were available when wanted.

Freight Cars Fall Behind

Freight Cars: The relatively favorable situation with respect to the increase in locomotive tractive effort is not apparent in the statistics covering freight cars. The railways have failed to increase the capacity of freight cars in proportion to the increase in traffic. The percentage figures are shown in the tabulation on the following page.

This table shows that while the number of freight cars up to 1913 did not increase in the same ratio as the volume of traffic, the total freight car capacity did increase in that ratio, whereas in 1916, 1918 and 1920 the volume of traffic had

Percentage Relationships—Basis Average 1902 to 1906 Equals 100

Years ended	Revenue ton-miles	No. of locomotives	Total locomotive tractive effort	No. of freight cars	Total freight car capacity	Multiple tracks	Yard tracks and sidings	Property investment
June 30								
1900	78.03	81.22	.....	80.69	.....	76.51	79.03	.....
1901	81.05	85.36	.....	86.53	.....	80.87	83.21	90.45
1902	86.67	88.90	75.25	91.36	84.97	86.00	88.22	92.65
1903	95.45	94.60	87.16	97.73	95.16	92.14	93.28	95.39
1904	96.17	100.80	94.98	99.99	99.57	99.69	100.75	100.07
1905	102.75	104.28	101.97	102.31	104.45	108.09	105.98	103.90
1906	118.96	111.42	113.91	108.61	115.85	114.07	111.77	106.97
1907	130.38	119.44	127.44	117.68	131.56	123.79	117.81	113.27
1908	120.34	122.34	131.67	123.46	142.58	128.84	120.39	113.59
1909	120.57	123.37	135.78	122.53	143.29	133.59	124.82	116.93
1910	140.52	127.11	143.29	126.17	149.98	137.84	129.68	125.08
1911	139.85	132.25	154.60	129.74	158.67	149.09	134.44	131.28
1912	145.52	134.26	161.16	130.92	162.37	158.37	138.84	134.83
1913	166.64	138.55	173.00	134.90	168.90	166.27	144.01	140.85
1914	159.48	141.59	181.00	138.00	178.40	174.73	148.59	145.98
1915	153.31	140.38	183.00	137.54	180.52	181.88	151.30	149.80
1916	190.23	137.71	185.00	135.81	181.90	182.97	154.64	153.77
December 31								
1916	202.87	138.17	188.00	136.74	184.83	185.54	156.29	155.58
1917	220.79	139.10	194.00	139.59	191.25	189.61	160.87	163.68
1918	226.90	143.04	206.00	140.80	193.85	195.88	164.30	167.84
1919	203.90	145.17	215.00	142.51	198.33	198.80	166.25	170.65
1920	229.66	145.00	217.00	140.27	197.00	198.43	167.47	176.22
1921	171.69	145.34	221.00	139.80	197.39	203.25	171.76	181.53

advanced far ahead of either the number of freight cars or the total capacity of the freight cars available. Naturally, one would expect a substantially greater increase in the ratio of capacity than in the number of cars, for the reason that there has been an increase in the average capacity per car and the tons per loaded car. In 1902 the average capacity

Year	Revenue ton-miles	Number of freight cars	Total freight car capacity
1902 to 1906	100	100	100
1907	130.38	117.68	131.56
1910	140.52	126.17	149.98
1913	166.64	134.90	168.90
*1916	190.23	135.81	181.90
1918	226.90	140.80	193.85
1920	229.66	140.27	197.00

*Fiscal year ended June 30.

of freight cars was 28 tons; in 1921 it had risen to 42.5 tons. Tons per loaded car in 1905 were 18.1; in 1920 they were 26.72. That the freight car capacity, nevertheless, has not kept up with the traffic volume is further evidenced in the fact that in 1913 the revenue ton-miles per ton of freight car capacity per year were 3,504, whereas in 1918 they had become 4,157, and in 1920, 4,140. These figures indicate, if nothing else, an excessive utilization of that part of the transportation machine represented by freight cars. When one realizes that in this period the miles per car per day remained almost stationary or that shippers are now just as hesitant as ever they were about loading cars to their rated capacity or unloading cars as promptly as they should, the idea presented is made even more to the point.

When did the retardation of the development of railroad equipment begin? It is impossible to set the exact date, but it approximates very closely to June 30, 1913. In the year ended on that date there was an increase in the capacity of equipment which has not been approached in any year since. In the 11 years ended June 30, 1913, the total increase in locomotive tractive effort was roughly 1,100,000,000 lb., or an average of about 100,000,000 lb. a year. In the eight and one-half years ended in 1921 the increase in locomotive tractive effort was 530,000,000 lb., or an average of only about 62,500,000 lb. a year. The rate of increase in total tractive effort after 1913 was 37½ per cent less than before.

The increase in the total capacity of freight cars in the 11 years ending with June 30, 1913, was 43,000,000 tons, an average of not quite 4,000,000 tons a year. The increase in freight car capacity in the eight and one-half years ending with December 31, 1921, was only 14,500,000 tons, or roughly 1,700,000 tons a year. The rate of increase in freight car capacity after 1913 was 57½ per cent less than before.

Why was there such a decline in the expansion of railroad equipment after 1913? From the time the Interstate Commerce Commission decided the first advance rates case in 1911 the tendency of the percentage of net return earned by the railroad was downward. When the business depression came and traffic declined in 1914 and 1915 the net return earned by the railroads declined to a little above 4 per cent. There was in consequence a sharp decline in the increase in the capacity of equipment in those years. After the big increase in business in 1916 there was an upward trend in the development of equipment, but this was brought speedily to an end by the war and the policy of the railroad administration under government control. The uncertainty as to the future of the railways prevailing in 1920 and the tremendous slump in traffic in 1921 tell the rest of the story.

Another Manner of Indicating

Inadequacy of Freight Car Supply

There are other ways of indicating the inadequacy of freight car supply. It is extremely conservative to say that the average freight car can hardly be expected to last 20

years, or that 5 per cent of the cars in service should be replaced annually merely to keep up the present supply without necessary additions to take care of increasing business as the country's volume of industrial production increases. The Class I railroads at the end of 1918 owned 2,325,673 freight carrying cars, of which 5 per cent would be 116,284. In 1919 they installed only 76,019 new cars; in 1920, but 36,044, and in 1921, but 62,351. In these same years their freight car retirements were respectively, 1919, 43,274; 1920, 75,197, and 1921, 68,661. This means first that at the end of 1921 there were in service 2,315,700 freight cars—less by approximately 10,000 than in 1918. And it also means that many cars were not retired in these years that should have been retired.

The railroads went through their peak of October, 1922, with 11.3 per cent of their cars in bad order. A normal percentage should be 5 per cent—some people would say 4. It is not surprising, therefore, that following an actual failure to keep up the number of cars to requirements an excess of 6 per cent of the total ownership of freight cars in bad order over normal should have assisted in bringing about the record-breaking car shortage figure of over 179,000 cars.

Retardation of Other Development

Other facilities: It is not as easy to secure statistics which will indicate for other railway facilities the relative increases such as may be pointed out in the case of cars and locomotives. In the tables which we have been discussing there are, however, shown three additional columns—namely, multiple tracks, yard tracks and sidings, and property investment. These, it will be found, point out exactly the same conditions as are evidenced in the case of cars and locomotives—a satisfactory expansion up to about 1913 and a failure since then to maintain that expansion.

The figures for the peaks 1907, 1910, 1913, 1916, 1918 and 1920 are shown as follows:

1902-1906 Period	Revenue 100 ton-miles	Multiple 100 tracks	Yard tracks 100 and sidings	Property 100 investment
1907	130.38	123.79	117.81	113.27
1910	140.52	137.84	129.68	125.08
1913	166.64	166.27	144.01	140.85
*1916	190.23	182.57	154.64	153.77
1918	226.90	195.88	164.30	167.84
1920	229.66	198.43	167.47	176.32

*Fiscal year ended June 30.

Insofar as concerns multiple tracks, yards and sidings and property investment, one will, of course, bear in mind that the railways of this country were built to a very considerable extent as pioneers. We should naturally expect, therefore, for a large proportion of the railways, as their territory develops, an increased utilization of tracks which we would not expect in units of locomotive tractive effort or in freight car capacity. This is shown in the increased traffic density which has been one of the outstanding characteristics of American railway development from its earliest stages. Traffic density figures do not take into consideration multiple tracks or yard tracks and sidings. Nevertheless, an increase in traffic density from 760,414 ton-miles per mile of line in 1901 to 1,747,948 in 1920 indicates greater utilization of all tracks as well as of miles of line alone.

But even these factors do not entirely explain the relatively small percentage increases in multiple tracks, in yards and sidings or in property investment in the more recent years. The years 1919 and 1921 in particular cannot be covered by them. These were years of cessation in railway progress. In 1921 the Pennsylvania Railroad charged to additions and betterments a net of \$1,000,000, whereas in a normal year it should charge a net of nearer \$50,000,000. The Pennsylvania can be considered as typical of nearly all the carriers.

The point might be made that signals or electrification

permit greater utilization of existing tracks and frequently postpone the necessity for building second or other multiple track. But the amount of new signal installations and the electrification developments in the past three or four years have been altogether too small to have any appreciable effect. At the present time, taking the situation as a whole, there is hardly a railroad which does not have a program for improvements embodying yards, terminals, engine houses, signals, etc., and possibly electrification, which its management considers of utmost urgency. Some progress was made in 1922 towards carrying out the extensive additions and betterment plans, but the progress has not been sufficient to overcome the retardation of either 1919 or 1921. All of which leads back to the original statement that the shopmen's strike has been an important factor in the 1922 traffic congestion but by no means the only factor.

On the whole, the analysis of these percentage figures should make it fairly evident that up to about 1913 the railways succeeded in expanding their facilities in sufficient degree to keep ahead of traffic demand. This had always been a noteworthy tendency in American railway history. Since 1913 this manner of development has not been continued. The country's business has continued to expand. Railway facilities have not kept pace. This is an unsatisfactory condition and it does not augur well for the future either of the railways or of the country's development as a whole.

1922's Special Conditions

The most important of the unusual conditions which the railroads had to face in 1922 were the coal and shop strikes. The railroads were deprived of the coal traffic for the better part of the summer. When the coal finally did begin to move and the attempt was made to compensate for the delayed movement which should have taken place earlier in the year, the railroads were handicapped by unsatisfactory conditions as to equipment repairs. The bad order car situation, which, it should be clearly understood, antedated the shop strike, was a heritage from the period of federal control and a handicap which the poor earnings of 1921 had prevented the railroads from remedying in time to have the cars available in sufficient quantity for the heavy business in the fall of 1922.

Business in 1922 was extremely good. The general improvement which took place throughout the year is shown in no better way than in the very satisfactory merchandise loadings which the railways reported from week to week. In the West there was one of the heaviest grain crops in several years. Grain requires cars in good condition. These cars were not available. The grain moved in large volume, the car loadings being much in excess of those in 1920. They continued much later than those of 1921, but the trouble was that the movement was not made as promptly as might have been desired and shippers found it impossible to secure an adequate number of suitable cars. One reads of the troubles which some of the western grain shippers have had in securing suitable cars. The Northwestern Miller said in a recent issue, "Minneapolis millers are employing literally hundreds of carpenters to patch up cars. They are taking all the crippled or out-of-order cars they can find, boarding and lining them and using them for all-rail shipments. One milling company alone has at present a crew of about 100 carpenters at work, and estimates that each car it gets is costing the company \$50 to \$75 for repairs."

Roads Handled 1922 Peak Business Handicapped by Excessive Amount of Unserviceable Cars

All these things are reflected in car loadings for the weeks ending October 21 and 28 in excess of 1,000,000 cars, the record loadings since the peak of 1920 and distinguished from that peak because they come at a later period in 1922 than has ever been the case. The railroads have had to

handle this near-record business with approximately 11 to 13 per cent of their cars in bad order and with from 26 to 28 per cent of their locomotives held out of service for repairs requiring over 24 hours. Finally, the result was the greatest car shortage in the history of the railroads. The car shortage began to develop about the middle of July following a period in which there was a surplus which on several occasions reached over 300,000 or even 350,000 cars. The shortage became acute in September when the coal movement began. The coal cars which previously had been standing on side tracks as surplus cars were put in movement and the demand for them was greater than the supply. Finally, at the end of October, in the peak weeks, the shortage reached 166,349 in one week and 179,239 the following week, the highest figure, as already noted, which the country has ever experienced.

How much equipment did the railways have actually available for handling this big business? The *Railway Age* has taken the monthly figures for a period beginning in January, 1917, and continuing it to date insofar as the figures are available. In the case of freight cars these figures develop that in 1917 the railways reported month by month cars on line amounting approximately to 2,300,000. In 1917 the unserviceable cars averaged per month throughout the year about 5.5 per cent. The peak month of 1917 was May, in which month the net ton-miles handled totaled 38,552,000,000. The reports for that month showed that the railways had on line an average number of cars totaling 2,288,446. The percentage of bad order cars was 5.6, or 128,809, leaving an average number of serviceable cars for the month of 2,159,637. This business resulted in a car shortage which on May 1 was reported as 148,627. The important figure is the one of average cars serviceable, namely, 2,159,637.

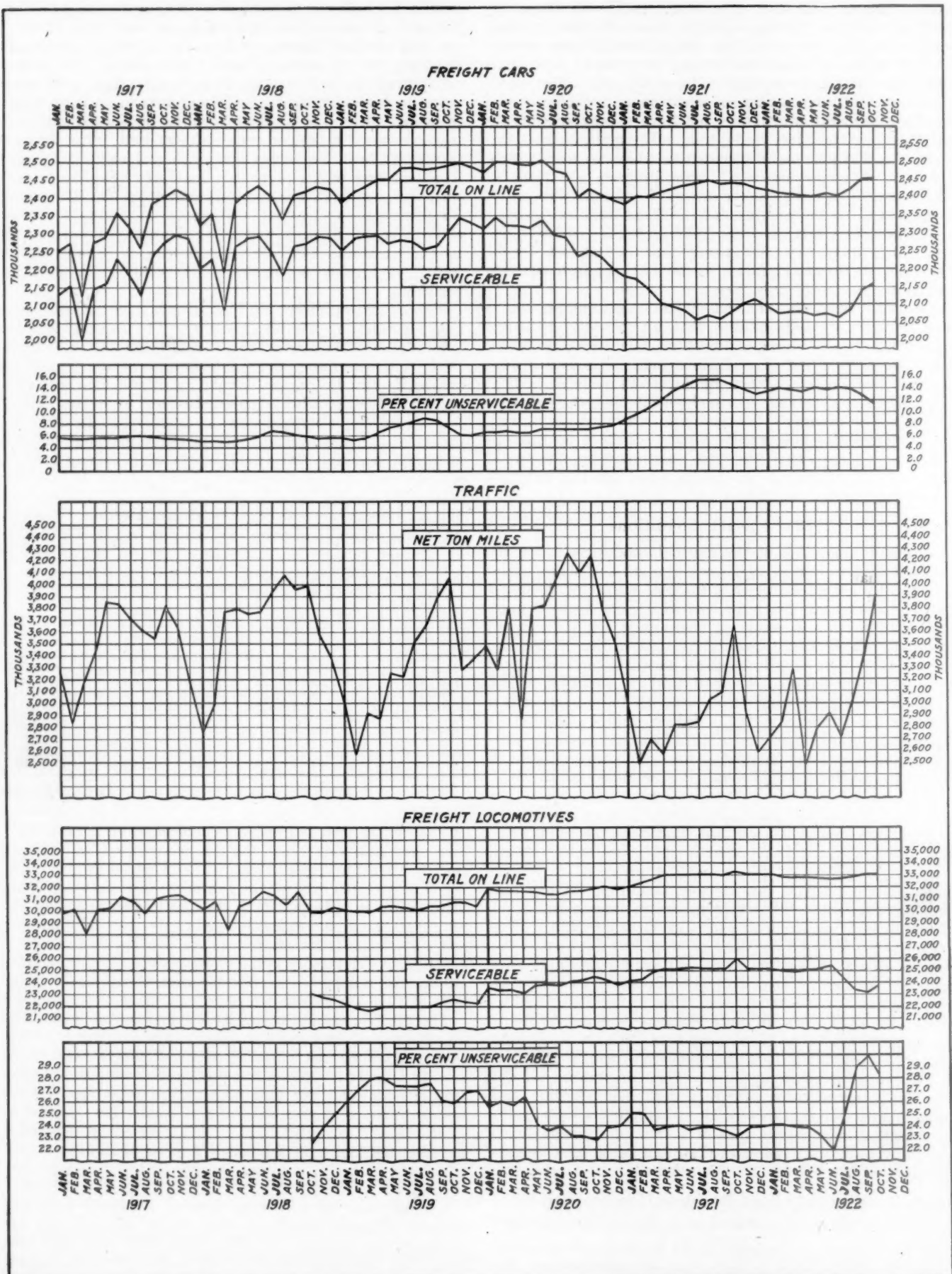
FREIGHT CAR CONDITION				
Month	Net ton-miles thousands	Total cars on line	Per cent unserviceable	Number serviceable
May, 1917	38,552,223	2,288,446	5.6	2,159,637
August, 1918	40,776,125	2,342,032	6.6	2,342,032
September, 1918	39,579,023	2,414,218	6.2	2,264,655
August, 1920	42,706,838	2,462,891	7.2	2,286,718
October, 1920	42,562,687	2,427,701	7.2	2,252,079
August, 1922	30,453,000	2,424,414	14.0	2,085,874
September, 1922	34,270,000	2,452,380	12.6	2,142,637
October, 1922	39,260,000	2,454,633	11.3	2,176,077

The peak business of 1918 developed in August. In that month the railroads moved 40,776,000,000 net ton-miles. In that month their percentage of unserviceable cars was 6.6. The number of cars which the Class I railways had on their line in August averaged 2,342,032, leaving an average number of serviceable cars for the month of 2,186,560. In October, 1918, in which month the railroads handled 39,842,000,000 net ton-miles, the railroads reported that they had an average number of cars on line for the month of 2,421,123. Of these 6 per cent were unserviceable, leaving an average number of serviceable cars of 2,276,774. For most of 1918 the railroads reported a surplus of freight cars.

The greatest amount of business ever handled in a single month in American railway history was in August, 1920. In that month the net ton-miles totaled 42,707,000,000. The average number of cars on line during the month was 2,462,891, of which 7.2 per cent were in bad order, leaving the average number of cars available to handle the business at 2,286,718. Throughout most of 1920 the roads reported a shortage, the figure on September 2 being 151,223.

Fewer Serviceable Cars Available in 1922

A comparison with the conditions of 1922 will bring out the very different conditions with which the railroads are at present confronted from those with which they were confronted in the peaks of 1917, 1918 or 1920. In August, 1922, net ton-miles on the Class I railroads totaled only 30,452,000,000. During the month railroads reported as having cars on line totaling 2,424,414, of which 14 per cent



For further explanation of chart see note on facing page.

Monthly Record of Freight Traffic, Cars and Locomotives on Line and Condition of Equipment from 1917 to Date

were in unserviceable condition, leaving available for service only 2,085,874. The September net ton-miles totaled 34,270,000,000. During the month the cars on line totaled 2,452,381. Of these an average for the month of 12.6 per cent were reported unserviceable leaving available for service 2,133,380. The traffic figures for October were the peak figures for the year 1922. Net ton-miles for the month totaled 39,260,000,000.

The railroads in October averaged cars on line 2,454,633, of which, deducting 11.3 per cent in bad order, there remained available to handle the October peak business, roughly 2,176,077 cars, which, it will be noted, is slightly more than the number of serviceable cars available in May, 1917; 10,000 less than in August, 1918; 88,600 less than in September, 1918, and 110,700 less than in August, 1920. Under these conditions it does not appear so surprising that the railways should have had to contend with a car shortage that during the last week of October totaled over 179,000 cars. These figures would seem to indicate that if the railways in 1920 and 1921 had had the funds sufficient to reduce their bad order car percentage to a more normal figure, such as 5 or 6 per cent, the number of freight cars which they would have had available would have enabled them to keep their car shortage much lower during the busier months of 1922. This is speculation, however. Nobody knows how much more business was available than could be handled. All that is known is that there was a great deal more.

Locomotive Situation as Bad or

Worse as in Case of Cars

The situation with respect to locomotive maintenance is even worse than with respect to freight cars, and more threatening in its immediate consequences. There are few railroad operating officers who will deny that their motive power condition is the weakest factor at present in the situation. The seriousness of the situation is not evidenced entirely in the statistics alone. The statistics show locomotives held out of service for repairs requiring over 24 hours. They do not show those locomotives considered suitable for operation which fail on the road for one reason or another and which cause excessive delays to their own and other trains, excessive overtime and relief of crews under the 16-hour law. There is no use in denying that the motive power situation on the railroads of this country at present is bad. It is, in fact, very bad on many roads and is likely to become worse with colder weather. A large number of the roads have not made the progress that they would have liked to have made in recruiting their shop forces to a proper standard. The output of the shops may be high but the locomotives that are at present being turned out have not been repaired as adequately as a staff of more efficient and more experienced shop employees would have repaired them.

This condition is, of course, being reflected in maintenance of equipment expenses and especially also in transportation

costs and it is largely because of these factors that October railway net earnings were not better than they were.

The figures relative to unserviceable locomotives go back only to October, 1918, because prior to that date unserviceable locomotives are reported on a different basis from that which now shows as an index of unserviceable locomotive conditions the number and per cent held out of service for repairs requiring over 24 hours. In October, 1918, the railroads under federal control reported as having on line an average for the month of 29,793 freight locomotives of which 22.5 per cent were reported in unserviceable condition, leaving available serviceable freight locomotives amounting to 23,098. In the peak month of 1920, namely, August, the number of freight locomotives reported on line for the Class I roads was 29,999, of which 23.1 per cent were in unserviceable condition, leaving an average number of serviceable locomotives for the month totaling 23,073. In 1920 the New York Central failed to report its number of locomotives on line or its number unserviceable. The figure of 23,073 should, therefore, be increased roughly 1,050 to include this road's average serviceable locomotives, making a total for all roads of approximately 24,100.

The condition in August, 1922, is represented in a total number of locomotives on line of 32,991, of which, due to the unsatisfactory conditions resulting from the shopmen's strike, 29.1 per cent were reported in unserviceable condition, which means that to handle the business available in August there were serviceable freight locomotives numbering 23,397. September conditions were slightly less favorable than those for August. Total freight locomotives on line were reported as averaging for the month of September 33,045, of which 9,878 or 29.9 per cent were reported in unserviceable condition, leaving available for service 23,167. The number of unserviceable freight locomotives was later slightly reduced.

FREIGHT LOCOMOTIVE CONDITION

Month	Net ton-miles thousands	Number on line	Per cent unserviceable	Number serviceable
October, 1918	39,842,297	29,793*	22.5*	23,098*
August, 1920	42,706,838	29,999†	23.1†	24,100‡
October, 1920	42,562,687	30,341†	22.7†	24,500‡
August, 1922	30,452,000	32,991	29.1	23,397
September, 1922	34,271,000	33,044	29.9	23,167
October, 1922	39,260,000	33,099	28.0	23,827

*Roads under federal control only.

†Excludes New York Central.

‡Includes estimated figure for New York Central.

The number of locomotives on line in October was 33,099, of which 9,272 or 28.0 per cent were unserviceable, leaving 23,827 locomotives serviceable. The number of locomotives on line reported at present is approximately 3,000 more than the railroads were reporting in the peak of 1918 and considerably more than in the peak of 1920, but due to the shop strike, the larger part of the additional locomotives are

SOURCES OF STATISTICS—Because of the fact that statistics pertaining to traffic and equipment are compiled by various organizations and the figures do not always agree, it seems desirable to state the sources of the data used in preparing the chart on page 24.

The figures for net ton miles include revenue and non-revenue freight. The total number of freight cars and locomotives on line, the number serviceable and the per cent unserviceable represent the averages for the month. These do not agree with the figures of the Car Service Division of the American Railway Association which reports the equipment situation as of the first and sixteenth of each month.

In preparing the chart of freight locomotives it was found that from October, 1918, to December, 1919, inclusive, the figures were available only for railroads under federal control. This change in basis explains the offset in the lines at these two points. During 1920 the New York Central did not make a report of locomotive condition, but a correction factor has been used in making up the chart to allow for this omission. The number of locomotives unserviceable includes only locomotives held for repairs requiring over 24 hours.

The instructions issued by the Interstate Commerce Commission for the compilation of the locomotive and car statistics are in effect as follows: The total number of locomotives on line includes steam and electric locomotives and should show the average number owned, leased and rented in freight service during the month (excluding owned locomotives in service on other roads), obtainable by dividing the total number of locomotive-days

of 24 hours assignable to freight service by the number of calendar days in the month. Locomotives running partly in freight service and partly in passenger service are included only for the days in freight service. The locomotive-days assignable to mixed and special service are apportioned to freight service on the basis of car-miles produced in those services, respectively. Stored or unserviceable locomotives are counted as freight locomotives if their usual assignment is to freight service; if it is too mixed, special, or joint service, an appropriate apportionment of the days is made as indicated above.

The average number of freight cars on line daily applies to home cars and to foreign cars, including private-line cars, but not caboose cars or work equipment. The average for the month of report is to be obtained by dividing by three the aggregate of the number of cars shown by a count of cars on line as of the first and the fifteenth of that month and the first of the succeeding month. Each carrier will be governed by local conditions in determining whether or not a car, which, according to the car records, is standing at an interchange point, but not shown on the "on hand" report for the date for which the count is taken, should be considered as "on hand." The average reportable for the cumulative period will be obtained by dividing the sum of the semi-monthly counts for the months within that period by the corresponding number of counts. The term "unserviceable cars" includes cars in or awaiting shops, bad-order cars at outlying points, etc. The term "serviceable cars" covers cars in serviceable condition and available for service, including cars stored.

not available for service but instead only a few additional are available as compared with 1918 and less as compared with 1920. The excess unserviceable locomotives embodied in the difference between 22 per cent and say 26 per cent represent, therefore, no small part of the reason for the present unsatisfactory conditions.

Unserviceable Locomotive Percentage Higher in East

In this connection a point of no small importance is brought out in the fact that the percentage of unserviceable freight locomotives has been running much higher on the eastern than on the western roads. On October 15, 1922, the per cent of unserviceable locomotives held for repairs requiring over 24 hours on all the roads of the country was 26.7. In the eastern region on the same date the figure was 32.1 and in what is designated group B of the eastern district—the roads entering New York City—it was 35.4. The worst locomotive condition and the greatest congestion were in the East; the car shortage was most severe in the West and South. The combination was the usual one which has been experienced several times in the past and whatever may be said about it, one fact is clear—the situation was entirely unsatisfactory.

Real Meaning of Car Shortage Reports

Any analysis of this kind must not neglect to take into consideration the real meaning of car shortage reports. A freight car shortage, it is true, usually does indicate in a measure an actual shortage of freight equipment. It also represents a great deal more. It will be borne in mind that the business in the peak of 1922 did not quite reach the peak—we refer to the net ton-mile figures—which was reached in 1918 or in 1920. The greatest value of the car shortage figure is that it is a symptom of railroad operating conditions. In other words, when a car shortage exists the outstanding characteristics of the railroad situation which results in the car shortage is the slowing up in the movement of freight, embargoes, failure to supply cars for loading, delayed delivery of consignments, etc. The volume of freight is greater but its rapidity of movement is less and this results in a condition in which shippers are not securing satisfactory service either from the standpoint of car supply or the movement of the cars which they do load to their destination. One is not prepared to say that the 1922 conditions, in spite of the size of the car shortage, were any more severe than those which were experienced in 1907, in 1918 or in 1920. They were, however, quite unsatisfactory and the indications are, on the whole, that the railways must take some rather drastic steps to bring about a better equipment condition.

Excess Bad Order Cars

The point was made that the railroads had in October a bad order car percentage of 11.3 per cent, representing an excess of about 6 per cent of the total ownership, over what should be considered normal. Six per cent of 2,450,000 is 147,000, which figure may be taken to represent the excess bad orders on the railroads at present. Of the October bad order cars, by far the larger proportion was heavy bad orders. The percentage of heavy bad orders to the total was about 9 per cent, and of light bad orders about 2 per cent. It would seem proper to say that the excess heavy bad orders amount to approximately one-half of the total bad orders, which would mean a percentage of 4½. It is conservative to assume 4 per cent, which means about 98,000 cars of the total cars on line. These bad order cars will require repairs amounting, at a low estimate, to \$600 each, or \$58,800,000, which represents, to put it in its simplest terms, a sum which the railroads must expect to spend in the future if they are in hopes of bringing their car condition to a more normal basis. It is difficult to apply a similar analysis to the locomotive condition, but that expenditures necessary to restore normal

locomotive conditions represent a very sizable figure is, of course, evident.

What May Be Expected in 1923

It is next in order to try to see what may be in prospect during 1923. An analysis of the comparison between car shortages and traffic handled shows on the whole that car shortages are to be expected when the monthly net ton-miles approximate or exceed 37,000,000,000. This traffic has been exceeded in a great many months in the last few years. A car shortage existed in 1922 when it was not exceeded but this condition was due to special factors which have already been outlined in this article. The general consensus of the opinion of the observers who follow business conditions closely is that 1923 should be a year of very satisfactory business conditions. The Harvard Economic Service which is probably as good an authority as any said in its Weekly Letter of October 14: "For the remainder of 1922 and the first half of 1923 we forecast an upward movement of prices and further expansion of business activity with a strong probability of a tendency of an upward swing during the second half of next year." This would seem to indicate that for a number of months in 1923 the railroads may properly expect business which will result in their being called upon to carry more than 37,000,000,000 net ton-miles which would point to the probability of long periods of car shortage, and, considering car shortage as a symptom of other conditions, of railroad difficulties generally. The question that arises is as to how much longer business in this country is going to be more willing to be slowed down by these recurrent periods of inadequate railway service than to let the railroads earn enough to stop them.

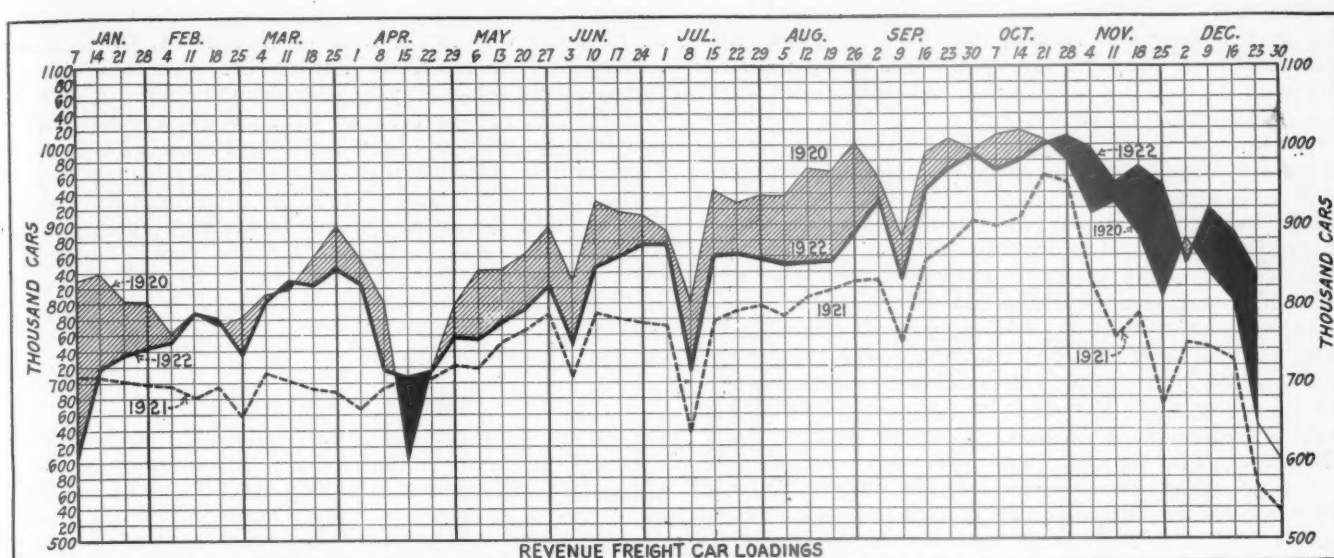
In conclusion, it is evident that the strike of the railway shop employees has proved a most serious drag on railway operating efficiency and has brought about conditions which will prove expensive to remedy. The shop strike, however, is only one of two important factors, and far from being the more important factor of the two. Taken by and large it remains that the industry of this country must be prepared to understand that the railways need adequate revenues; first, to overcome the unsatisfactory conditions which still remain as a heritage from federal control and from the years 1921 and 1922, and, second, in order that they may again be able to add to their physical plant to an extent which will enable them to deal with the increase in the country's business as well as before the war.

If the railroads in the 8½ years ended December 31, 1921, had increased the total capacity of their freight cars as much annually as they did in the 11 years ended on June 30, 1913, they would now have the equivalent of 391,000 freight cars of an average capacity of 50 tons more than they actually have.

If in the 8½ years ended December 31, 1921, they had increased the total tractive effort of their locomotives as much annually as they did in the 11 years ended on June 30, 1913, they would now have the equivalent of 6,400 locomotives with an average tractive power of 50,000 lb. in excess of the number they now actually have.

In spite of the large increases in railroad capacity which occurred down to 1913 the railways found it difficult, and even impossible, to handle all the business that was offered to them when business revived after the depression in 1914 and 1915.

The country is entering a period of active business which apparently will last for some time. The foregoing figures give some idea of the extent of the retardation of railroad development within the last decade. Do they not also throw some light on what will be the business and transportation conditions during the next few years if the production and commerce of the country try to increase as much as they actually did increase in past periods of general prosperity?



The Black Area Shows Those Weeks in Which Car Loadings in 1922 Were in Excess of Those of 1920, the Shaded Area the Weeks in Which the 1920 Loadings Were the Heavier. Note How Far 1921 Falls Below Either 1920 or 1922.

Ups and Downs in Railway Freight Traffic in 1922

Car Loading Other Than Coal Breaks All Previous Records—
Business Recovers Rapidly From Depression

By H. F. Lane

Peak of revenue freight car loadings delayed in 1922, as compared to normal years, because of the shop crafts and coal strikes.

Heavy movement of coal prior to April 1 and also during the last months of the year after the resumption of coal mining. Loads of grain, grain products, merchandise and miscellaneous freight greater than in any previous year.

Shop strike did not cause the severe freight car congestions which were experienced during the first year of our entry into the World War.

Passenger traffic lighter than in 1921.

THE RAILROADS of the United States have had both a feast and a famine of freight traffic in 1922, the famine coming during the first part and the feast during the latter part of the year. The year began with traffic, as indicated by revenue freight car loading, at about as low a point as it had ever been in recent years but, in addition to the usual seasonal increase during the year, in the last two months or so it has been greater than ever before at the corresponding season and, with the exception of coal, more carloads of freight have been loaded than in any previous year. Also there was a surplus of freight cars of almost record proportions during the first week of January, while by November 1 the car shortage was greater than had ever before been known. As the year closes the shortage has been gradually reduced but the accumulation of freight as the result of strikes and the inability of the railroads to handle

it promptly caused the peak of the year's traffic to come later in the season than usual.

As measured in revenue carloads, the volume of freight traffic in 1922 has been greater than ever before except during the war year 1918 and the year of the post-war boom, 1920, and the decrease as compared with those years is more than accounted for by the decrease in coal.

Increases Over 1921

With December estimated, the total revenue car loading for the year has been approximately 43,200,000 as compared with 39,037,817 in 1921, 45,118,863 in 1920, 42,180,328 in 1919, and 44,755,041 in 1918. The weekly car loading figures are less accurate than the ton-mile figures because they are reported rapidly for current use and because they do not reflect changes in the average tonnage per car or in the average haul, but the ton-mile figures are available only for the first ten months of the year. The average carload during the greater part of the year was about $1\frac{1}{2}$ tons less than it was during 1921 and about $2\frac{1}{2}$ tons less than in 1920 when an intensive campaign for heavy car loading was conducted; the increase in traffic, therefore, is somewhat less than indicated in the loading figures. The number of net ton-miles of revenue freight for the first ten months of 1922 is estimated as 272,855,043,000 as compared with 259,327,890,000 in the corresponding months of 1921. Because of reductions in rates, however, the freight revenue was less than it was in 1921.

Busy First Three Months

Following the year of business depression, 1921, when railroad freight traffic was lower than it had been in any of the previous five years, the demand for railroad transportation increased very rapidly during the first three months of 1922 and the total loading for the three months corre-

sponded very closely to that for 1920, being increased somewhat by a heavier coal loading than usual in anticipation of the strike. A temporary let-up was caused by the large falling off of coal traffic resulting from the miners' strike which began on April 1. Other classes of traffic continued to increase but by the time the total loading had reached the point attained before the coal strike, the shop strike occurred and caused another setback. How much business was actually lost because of the two strikes, and how much the total railroad traffic after their first effects were over fell below what it would otherwise have been and how much was merely postponed would be difficult to estimate, but it is certain that together they had the effect of preventing the traffic handled by the railroads from reaching an unprecedented figure. However, it is probable that coal loading will hold up during the winter more than if an opportunity had been afforded earlier to accumulate reserve stocks.

For the total period of the coal strike, April 1 to September 16, the revenue coal loading was only 2,181,451 cars or 1,412,000 cars less than that for the corresponding period of 1921 and 2,257,000 below that for the corresponding period of 1920. Since September 16 the loading of coal has been considerably in excess of that for 1921 but it has still been below that for 1920. These figures refer only to the revenue loading. The total car loading has been greater but a considerable part of it has been railroad fuel because, to prevent increases in price, large consumers of coal had adopted a policy of not trying to accumulate the usual reserves.

Records Broken in 1922

While 1920 still holds the record for the largest car loading for a single week, some other records were broken in 1922. The loading of grain and grain products was greater than that for any previous year, following a similar experience in 1921, and the loading of merchandise and miscellaneous freight combined was also greater than for any previous year. Also, as an aggregate, all commodities other than coal show an increase over previous years.

Car Surpluses and Shortages

During the first week in January the car surplus reached a total of 470,516, which had been exceeded only in two previous periods since the records have been kept—in the first part of 1919 and in the first part of 1921. After a gradual reduction there was another considerable increase in surplus following the shutdown in the union coal mines, but a car shortage began to appear in some sections about July 1 and by September 1 the shortages amounted to 67,889, and exceeded the surpluses. By November 1 the average daily shortage had reached 179,239 but this has since been reduced each week.

Prior to the strike of the shop crafts on July 1 the Car Service Division of the American Railway Association had prepared an estimate of car loading for the remainder of 1922, based on the assumption that coal mining would generally be resumed not later than August 1 and that the loading for the last half of the year could reasonably be expected to increase at a ratio corresponding to the average of the years 1919, 1920 and 1921. This estimate indicated that a peak loading of 1,100,000 cars would be reached for the week of October 21, which figure is in excess of anything of record heretofore; also that this would be accomplished without appreciable car shortage or transportation difficulty. Of course, this estimated figure was not attained because the coal strike continued until the middle of September and the shop strike on the railroads also intervened.

Loadings Off During Coal Strike

From July 1 until November 4 the loading fell below the estimated figures then made and the peak was reached in the week of October 28 with a total of 1,014,480 cars loaded,

three-quarters of one per cent less than the previous record of 1,018,539 cars in the week of October 14, 1920. Since November 4, however, the loading has been in excess of that shown in the chart plotted to show the estimate, as well as above that for any previous year, and the seasonal reduction from the peak has been less abrupt than it has been in former years. Also the peak this year was from one to five weeks later than it had been in the four preceding years, since the total car loading figures for all the roads were first compiled. The peak loading in 1918 was reached during the week of September 23—989,788 cars; in 1919, in the week of September 23—995,901 cars; in 1920, in the week of October 14—1,018,539 cars, and in 1921, in the week of October 21—964,811 cars.

Increases Later in Year

Since the first week of 1922 the loading has been continuously in excess of that for the corresponding week of 1921, the weekly increase ranging from 5,000 cars during the second week of the year to as much as 200,000 during the latter part of the year. Throughout most of the early part of the year the loading was below that for the corresponding weeks of 1920, except that for two or three weeks in February and March the figures were approximately the same in the two years and in April this year the drop was not so violent as that which accompanied the switchmen's strike in 1920. In the last week of September, however, the loading caught up with that for 1920 and since October 21 it has been well above that for 1920.

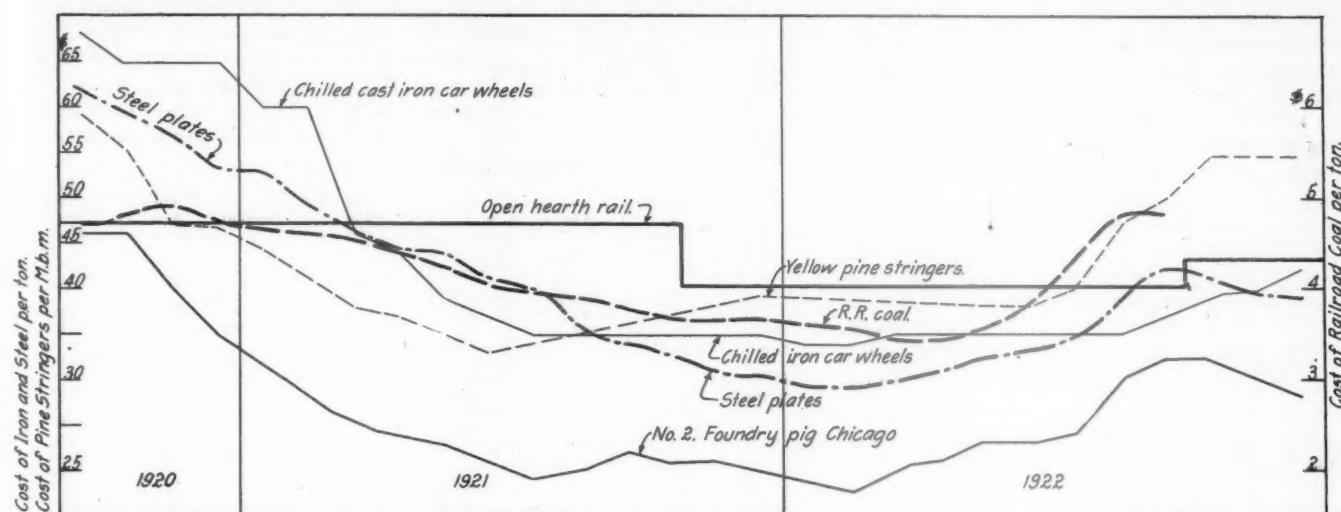
Car loading was showing a rapid increase during the first three months of 1922, just as it had in 1920, when the coal strike which began on April 1 caused a drop of over 100,000 cars for about two weeks—from 827,611 for the week of April 1, to 706,713 for the week of April 15—just as the switchmen's strike had caused a sharp drop in 1920. Then the increase began again but it was not until the week of June 10, when the loading was 846,002, that the previous figures were reached. The increase continued until June 24, when there was a slight decrease even before the shop strike began, caused by the congestion on the railroads serving the non-union coal fields. The first week of the shop strike also included the Fourth of July holiday but its first effect may be measured in part by the fact that for the week ending July 15 the loading was only 860,907 or 15,889 less than for the week ended July 1. The figures remained at about this level—although they fell as low as 851,351 during the week of August 5—until the week of August 19, from which time there was a steady rise until October 28, broken only by the Labor Day holiday and a drop of about 20,000 cars during the first week of October.

The Shop Strike

The shop strike did not cause anything like the accumulation of freight in the hands of the railroads that was experienced as the result of an unusual rush of freight and unusually severe weather during the first winter after the United States entered the war or as the result of the switchmen's strike in 1920. During both of those periods the accumulated carloads of commercial freight which carriers were unable to move or dispose of promptly, and therefore held awaiting movement, reached over 200,000. This year the maximum was 80,320 during the third week of September. In 1920 the congestion was at large terminals. This year the loaded cars accumulated at intermediate terminals or were set out at sidings along the line.

Passenger Traffic

Passenger traffic statistics are available only for the first nine months of 1922. The number of passengers carried one mile was 26,676,449,000 as compared with 28,936,212,000 in 1921.



Range of Prices for Typical Railroad Materials

The Prices of All Materials Have Increased

Railroads Must Now Pay From 7 to 70 Per Cent More for Their Supplies Than a Year Ago

By C. B. Peck and W. S. Lacher

The second half of the business cycle begun in 1920 is now in progress.

During the first period the sudden cessation of demand effected marked reductions in prices.

During the second period a gradual resumption of purchases slowly stiffened the market. Labor difficulties introduced certain disturbing factors but with subsequent readjustments advances have continued to the end of the year.

There is now evidence of at least a temporary stabilization of prices at present levels but with the continuance of demand further increases are probable in 1923.

AS COMMODITY PRICES are subject to variations with current economic conditions, they bear a definite relation to the recurring cycles of business expansion and depression. Therefore, any discussion of the material market must begin and end with the periods marking the general advances and reductions in prices rather than the limits of a single twelve months.

Thus, for a proper understanding of present market conditions one must go back to the fall of 1920 when the collapse of the great inflation led to a period of marked decline in all prices. But while the crest of the rise in 1920 is rather clearly defined, the duration of the deflation period has been subject to considerable variation as seen in the several charts showing the ranges of material prices. For example, the point of lowest prices in lumber was reached early in the fall of 1921, whereas the greatest decline in the steel market was not experienced until nearly six months later. This demonstrated that, whereas all commodities are subject to cer-

tain basic influences that are identical, the market for each is affected by certain conditions peculiar to it. This requires that each class of materials be considered by itself.

Lumber on the Upgrade for 18 Months

The lumber market suffered a most profound decline in the second half of 1920, which was continued to a less marked degree in the first half of 1921. But since the middle of the latter year, the prices have been on a steady upward climb. No doubt the most important influence affecting the restoration of the lumber market was the home-building campaign undertaken in 1921, which definitely preceded the expansion of business in other lines. Freedom from severe labor disturbance in the building trades was also a favorable factor and with the general prosperity of 1922, the lumber industry enjoyed an even greater demand. A healthy relation of production and shipments was maintained during most of the year until the general shortage of transportation reduced deliveries and dammed up the demand to such an extent as to offset or postpone the seasonal easing of requirements and prices that usually occurs during the early winter months.

The range of prices for items of interest to the railroads, as a consequence of the influences discussed, is illustrated in the tables and diagrams. Further information is supplied by the table of miscellaneous lumber items abstracted from information issued by the United States Department of Commerce.

Iron and Steel Market

The iron and steel market suffered a continuous decline from August, 1920, until February, 1922, when the more general rehabilitation of business manifested its influence. This is clearly shown in the diagrams of general tendencies for iron and steel prices on items of interest to the railroads. The lag of the steel market behind that of lumber is indicated by the date of the reduction of the price of steel rails from \$47 to \$40 in October, 1921, at a time when the lumber mar-

FREIGHT CARS

Road	No.	Type	Capacity	Construction	Builder	Price		Order	Equipment Trust
						Each	Total		
Baltimore & Ohio.....	1,000	Gondolas	70-ton	Steel	Cambria	\$1,600	\$1,600,000	June 3	Aug. 26
	1,000	Box	40-ton	St. Unf.	.....	1,700	1,700,000	.....	Aug. 26
	1,000	Hopper	50-ton	Steel	.....	1,500	1,500,000	.....	Aug. 26
Chesapeake & Ohio.....	1,500	Box	40-ton	St. Unf.	Am. C. & F.....	1,550	2,325,000	Apr. 29	May 13
	500	Vent. Box	40-ton	St. Unf.	Newport News Ship Bldg. & Dry Dock Co.	1,600	800,000	June 10	May 13
	200	Stock	40-ton	St. Unf.	Am. C. & F.....	1,100	220,000	Apr. 29	May 13
	50	Refrig.	40-ton	.....	Am. C. & F.....	2,800	140,000	Aug. 12	May 13
	1,500	Gondola	57½-ton	Steel	Pullman	1,600	2,400,000	May 13	May 13
	1,500	Hopper	.....	Steel	Newport News Ship Bldg. & Dry Dock Co.	1,500	2,250,000	May 13	May 13
Chicago & North Western.....	1,250	S. S. Box	40-ton	St. Frame	Western Steel Car & F. Co.....	1,858	2,323,500	Apr. 29	July 15
	500	Stock	40-ton	St. Unf.	Pullman	1,580	790,000	Apr. 29	July 15
	500	Flat	50-ton	St. Unf.	Western Steel Car & F. Co.....	1,343	671,500	Apr. 29	July 15
	250	Refrig.	40-ton	St. Unf.	Am. C. & F.....	2,772	693,000	Apr. 29	July 15
	250	Gondola	50-ton	St. Unf.	Pullman	1,677	419,250	Apr. 29	July 15
	300	Ballast	.....	.....	Roger Ballast Car Co.	1,950	585,000	Apr. 29	July 15
Chicago, Indianapolis & Louisville....	300	Gondola	50-ton	St. Frame	Am. C. & F.....	1,675	502,500	Aug. 26	Sept. 23
Chicago, Great Western.....	500	Box	50-ton	.....	Pullman	1,850	925,000	Oct. 14	Nov. 4
Chicago, Milwaukee & St. Paul.....	1,000	Gondola	50-ton	St. Frame	.....	1,533	2,301,000	.....	July 15
	1,000	Gondola	50-ton	St. Frame	.....	1,544	1,544,000	.....	July 15
	1,000	Box	40-ton	St. Unf.	Pullman	1,503	1,503,460	Apr. 1	July 15
	1,000	Box	40-ton	St. Unf.	Western Steel Car & F. Co.....	1,494	1,494,010	Apr. 1	July 15
	1,500	Box	40-ton	St. Unf.	Bettendorf	1,513	2,264,560	Apr. 1	July 15
Cincinnati, Indianapolis & Western.....	207	Gondola	50-ton	St. Frame	Gen. American ...	1,529	764,670	Apr. 1	July 15
					Am. C. & Foundry	1,815	375,653	Oct. 7	Dec. 7
					1,000 Pullman; 500 American Car & Foundry Co.; 500 Mt. Vernon Car Mfg. Co.; 500 Bettendorf; 500 Western Steel Car & F. Co.....	1,768	5,302,875	July 29	Oct. 14
Illinois Central	3,000	Gondola	50-ton	St. Frame	.....	1,768	5,302,875	July 29	Oct. 14
Interstate	1,000	Hopper	55-ton	Steel	Pressed Steel Car Co.	1,500	1,500,000	Oct. 14	.....
New York Central Lines:									
New York Central.....	1,000	Hopper	55-ton	Steel	Am. C. & F. Co..	1,470	1,469,930	Apr. 15	July 15
	1,000	Box	50-ton	Steel	Am. C. & F. Co..	2,047	2,047,170	Apr. 15	July 15
	1,000	Box	50-ton	Steel	Std. Steel Car Co.	2,061	2,060,700	Apr. 15	July 15
	1,000	Highside Gondola	50-ton	Steel	Pressed Steel Car Co.	1,607	1,607,050	Apr. 15	July 15
	1,000	Refrig.	35-ton	.....	Mer. Des.	2,660	2,600,000	May 6	July 15
Big Four	2,000	Hopper	55-ton	Steel	Am. C. & F. Co..	1,475	2,949,180	Apr. 15	July 15
	2,000	Box	50-ton	Steel	Am. C. & F. Co..	2,048	4,095,300	Apr. 15	July 15
Michigan Central	2,000	Auto	50-ton	Steel	Std. Steel Car Co.	2,111	4,222,060	Apr. 15	July 15
	500	Highside Gondola	50-ton	Steel	Gen. American ...	1,606	803,205	Apr. 15	July 15
	500	Highside Gondola	50-ton	Steel	Buffalo Steel Car Co.	1,607	803,450	Apr. 15	July 15
	500	Refrig.	35-ton	.....	Mer. Des.	2,660	1,330,000	May 6	July 15
Pittsburgh & Lake Erie.....	1,500	Hopper	70-ton	Steel	Std. Steel Car Co.	1,785	2,677,185	Apr. 15	July 15
Pittsburgh, McKeesport & Youghiogheny.	1,000	Lowside Gondola	70-ton	Steel	Std. Steel Car Co.	1,789	1,789,340	Apr. 15	July 15
	1,000	Hopper	70-ton	Steel	Std. Steel Car Co.	1,783	2,674,530	Apr. 15	July 15
	1,000	Lowside Gondola	70-ton	Steel	Pressed Steel Car Co.	1,789	1,789,340	Apr. 15	July 15
Cincinnati Northern	250	Auto., D. S.	40-ton	.....	Am. C. & F. Co..	1,778	444,550	Apr. 15	July 15
Norfolk & Western.....	2,000	Hopper	55-ton	Steel	Pullman	1,475	1,106,213	Apr. 15	July 15
	1,000	Hopper	70-ton	Steel	Pressed Steel Co..	1,777	3,554,000	Mar. 25	June 30
	1,000	Hopper	70-ton	Steel	Am. C. & F. Co..	1,773	1,773,000	Mar. 25	June 30
Northern Pacific	1,000	Hopper	70-ton	Steel	Std. Steel Car Co.	1,781	1,781,000	Mar. 25	June 30
	1,000	Auto	.....	.....	Gen. American ...	2,000	2,000,000	July 1	Sept. 9
	250	Gondola	.....	.....	Gen. American ...	1,595	398,750	July 8	Sept. 9
	250	Stock	.....	.....	Gen. American ...	1,505	376,250	July 1	Sept. 9
	250	Hart Convertible	.....	.....	Roger Ballast Car Co.	2,180	545,000	June 24	Sept. 9
St. Louis-San Francisco.....	1,000	Refrig.	.....	.....	Am. C. & F. Co..	2,371	2,371,000	Apr. 1	Sept. 9
	1,000	Hopper	55-ton	Steel	Chickasaw Ship Bldg. Co.	1,635	1,635,000	Sept. 23	Oct. 28
	500	Hopper	55-ton	Steel	Pullman	1,640	819,750	Sept. 23	Oct. 28
	750	Box	40-ton	St. fr.	Am. C. & F. Co..	1,965	2,358,000	Sept. 23	Oct. 28
	300	Stock	40-ton	St. unf.	Mt. Vernon	1,690	507,000	Sept. 23	Oct. 28
Seaboard Air Line.....	900	Vent. Box	40-ton	St. fr.	Pressed Steel	1,841	1,656,891	June 3	Aug. 19
	100	Phosphate	50-ton	Steel	Magor Car Corp..	1,762	176,227	June 3	Aug. 19
Texas & Pacific.....	150	Tank 10,000 gal.	50-ton	.....	Am. C. & F. Co..	1,920	288,000	Sept. 9	Nov. 4
Wabash	750	Hopper	50-ton	Steel	.....	1,210	907,500	.....	.....
	2,050	Gondola (bodies)	40-ton	St. fr.	Gen. American ...	1,291	2,646,550	June 24	Aug. 5
	750	Auto	40-ton	St. unf.	Am. C. & F. Co..	1,838	1,378,500	June 24	Aug. 5
	750	Auto	40-ton	St. unf.	Pullman	1,831	1,373,250	June 24	Aug. 5

PASSENGER TRAIN EQUIPMENT

Road	No.	Type	Construction	Builder	Price		Order	Equipment Trust
					Each	Total		
Baltimore & Ohio.....	2	Diners	Steel	.....	\$45,000	\$90,000	.....	Aug. 26
	2	Diners	Steel	.....	43,000	86,000	.....	Aug. 26
	40	Diners	Steel	.....	38,000	76,000	.....	Aug. 26
	30	Coaches	Steel	.....	21,400	856,000	.....	Aug. 26
	5	Express	Steel	American C. & F.....	18,000	540,000	Oct. 14	Aug. 26
	3	Postal	Steel	.....	21,550	107,750	.....	Aug. 26
	3	Bag. and Postal	Steel	.....	21,010	63,030	.....	Aug. 26
Boston & Maine.....	65	Baggage	Steel	Osgood Bradley	20,700	1,345,500	Apr. 8	.....
	20	Smoking	Steel	Osgood Bradley	20,700	401,400	Apr. 8	.....
	8	Smoking and Bag.	Steel	Osgood Bradley	19,000	152,000	Apr. 8	.....
	5	Mail and Bag.	Steel	Osgood Bradley	17,750	88,750	Apr. 8	.....
	25	Milk	Steel	Laconia Car Co.....	9,110	227,750	Apr. 8	.....
Central of New Jersey.....	30	Coaches	Steel	Standard Steel Car Co.....	19,989	599,674	Mar. 4	June 3
	20	Coaches	Steel	American C. & F.....	20,121	402,410	Mar. 4	June 3
	10	Pass. and Bag.	Steel	American C. & F.....	18,359	183,594	Mar. 4	June 3
Chesapeake & Ohio.....	30	Coaches	Steel	Bethlehem	16,613	166,127	Mar. 4	June 3
	6	Pass. and Bag.	Steel	.....	20,000	600,000	.....	May 13
	25	Mail and Bag.	Steel	.....	29,333	176,000	.....	May 13
	5	Diner	Steel	.....	18,000	450,000	.....	May 13
Chicago, Indianapolis & Louisville....	4	Coaches	Steel	Pullman	40,000	200,000	.....	May 13
Long Island	40	Coach (Motor)	Steel	American C. & F.....	24,000	96,000	Sept. 9	Sept. 23
	10	Coach	Steel	American C. & F.....	26,961	1,078,440	June 21	June 10
Norfolk & Western	7	Diners	Steel	American C. & F.....	14,774	147,735	June 21	June 10
Northern Pacific	70	Refr.	.....	Pullman	39,670	277,690	May 6	June 3
Seaboard Air Line	4	Diners	Steel	American C. & F.....	7,200	504,000	July 27	Sept. 9
					35,000	140,000	.....	Aug. 19

ket was already well on the upward grade. The diagram shows also the tendency of prices for railway items to lag behind those for items not definitely influenced by rail purchases, indicating the effect of the established habit of the railroads to stay out of the market until the period of business expansion has been well developed.

The iron and steel industry suffered grievously from the

represented simply a readjustment of a temporary condition and were not the manifestation of any weakness of general market conditions. Because the demand for steel during 1922 necessitated an output estimated at about 65 per cent of the record maximum of 1917 as compared with a 42 per cent production during 1921, the prices commanded by iron and steel products at the close of the past year are on a much

DOUGLAS FIR MILL PRICES (ACTUAL RAILWAY PURCHASES)

	1921		1922											
	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Stringers, 8 by 16, 32 ft., No. 1, common...	\$16.00	\$17.00	\$19.00	\$18.00	\$17.00	\$17.00	....	\$19.00	\$20.00	\$21.00	\$22.00	\$22.00	\$22.00	....
Timbers, 12 by 12, 32 ft. and under, No. 1 common	13.00	15.00	17.00	16.00	15.00	16.00	....	18.00	18.00	19.00	20.00	20.00	20.00	....
Dimensions, 2 by 6 and 8, No. 1, common	11.00	12.00	13.00	13.00	12.00	12.00	....	16.00	16.00	18.00	19.00	19.00	19.00	....
Dimensions, 2 by 12, No. 1, common	12.00	13.00	14.00	14.00	13.00	13.00	....	17.00	17.00	19.00	20.00	20.00	20.00	....
Boards, 1 by 6, No. 1, common	16.00	17.00	16.00	16.00	16.00	16.00	....	20.00	20.00	19.50	19.50	19.50	20.50	....
Car framing, select, common	15.00	16.00	20.00	19.00	18.00	18.00	....	20.00	21.00	21.00	23.00	25.00	26.00	....
Car sills, 41-45 ft.	18.00	19.00	23.00	21.00	22.00	22.00	....	24.00	25.00	25.00	27.00	29.00	30.00	....
Car siding, No. 2, clear and better	45.00	45.00	47.50	40.00	45.00	45.00	....	50.00	55.00	55.00	55.00	55.00	58.00	....
Car lining, select, common, D. & M.	20.00	20.00	20.00	20.00	22.00	25.00	....	25.00	26.00	26.00	26.00	27.00	27.00	....
Car decking, finished, select common D. & M.	19.00	19.00	19.00	19.00	19.00	20.00	....	20.00	23.00	23.00	25.00	25.00	27.00	....
Switch ties, common	13.00	14.00	15.00	15.00	14.00	14.00	....	16.00	16.00	16.50	17.00	18.00	18.00	....
Crossing plank, common	13.00	15.00	16.00	16.00	15.00	15.00	....	18.00	18.00	19.00	20.00	20.00	20.00	....

SOUTHERN PINE MILL PRICES (ACTUAL RAILWAY PURCHASES)

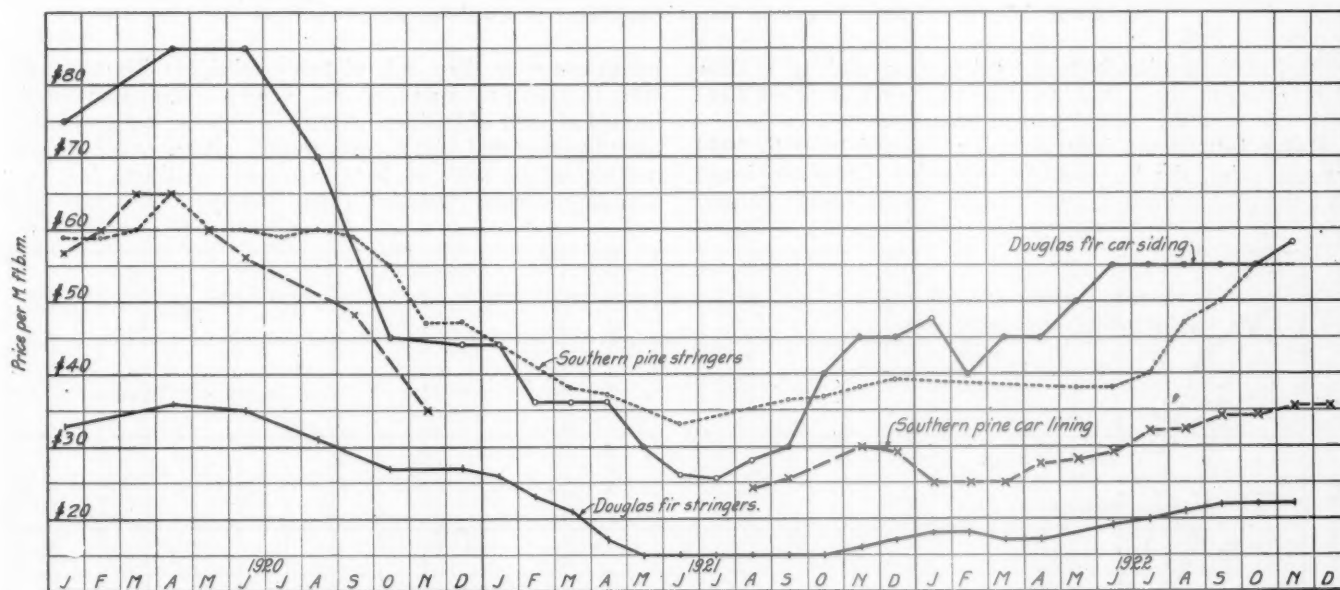
1922	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Stringers, 7 by 16 by 28	....	\$31.00	\$31.00	\$31.00	\$38.00	\$38.00	\$40.00	\$47.00	\$50.00	\$55.00	\$55.00	\$55.00
Bridge material, 12 by 12, 22	....	....	....	....	34.00	34.00	34.00	36.00	38.00	42.00	45.00	45.00
Car sills, 36 in. 40 ft.	....	....	....	....	32.00	36.00	36.00	36.00	41.00	42.00	42.00	46.00
Car lining	\$25.00	25.00	25.00	27.50	28.00	29.00	32.00	32.00	34.00	34.00	35.50	35.50
Car siding, 9 ft.	....	....	....	52.00	52.00	55.00	55.00	55.00	60.00	60.00	62.00	62.00
Car decking, 2 in., 10 ft.	26.00	26.00	26.00	28.00	28.00	28.00	28.00	30.00	32.00	34.00	34.00	34.00
Car decking, 2 in., 10 ft.	26.00	26.00	26.00	28.00	28.00	28.00	28.00	30.00	32.00	34.00	34.00	34.00
Crossing plank, W. O., 3 by 10, 16 ft.	23.00	23.00	23.00	23.00	23.00	25.00	25.00	25.00	27.00	27.00	27.00	27.00
1 by 8, 14 ft.	23.00	23.00	35.00	35.00	35.00	36.00	35.00	38.00	40.00	40.00	43.00	43.00
2 by 4, 14 ft.	23.00	23.00	25.00	25.00	25.00	25.00	25.00	27.00	29.00	29.00	31.00	31.00
2 by 10, 16 ft.	27.00	27.00	27.00	27.00	27.00	29.00	29.00	29.00	31.00	33.00	33.00	33.00

shortage of fuel brought about by the coal strike and the shortage of transportation resulting from the shop strike. During the summer months the output was reduced to less than 50 per cent of capacity, upsetting the current relation of supply to demand. This led to a rapid rise in prices between June and October and brought about conditions that for a time bore a striking resemblance to the boom days of

more favorable basis, from the standpoint of the manufacturers, than they were a year ago.

Cars and Locomotives

The prices of cars and locomotives, like those of the basic commodities entering into their construction, reached their peak in 1920 and what has been said with respect to the trend



Range of Prices Paid by Two Railroads for Specific Lumber Items

1920. It was at the height of this period that an advance from \$40 to \$43 in the price of rails was announced.

An increase in fuel deliveries following the settlement of the coal strike led to a rapid recovery of the steel production in September and with some lessening of the demand there resulted an easing of the steel market which was reflected in some minor lowering in prices. However, sufficient time has elapsed since these reductions to indicate that they

of commodity prices since that time, in general applies with equal force to the trend of prices paid by the railroads for their new motive power and rolling stock during the past two years.

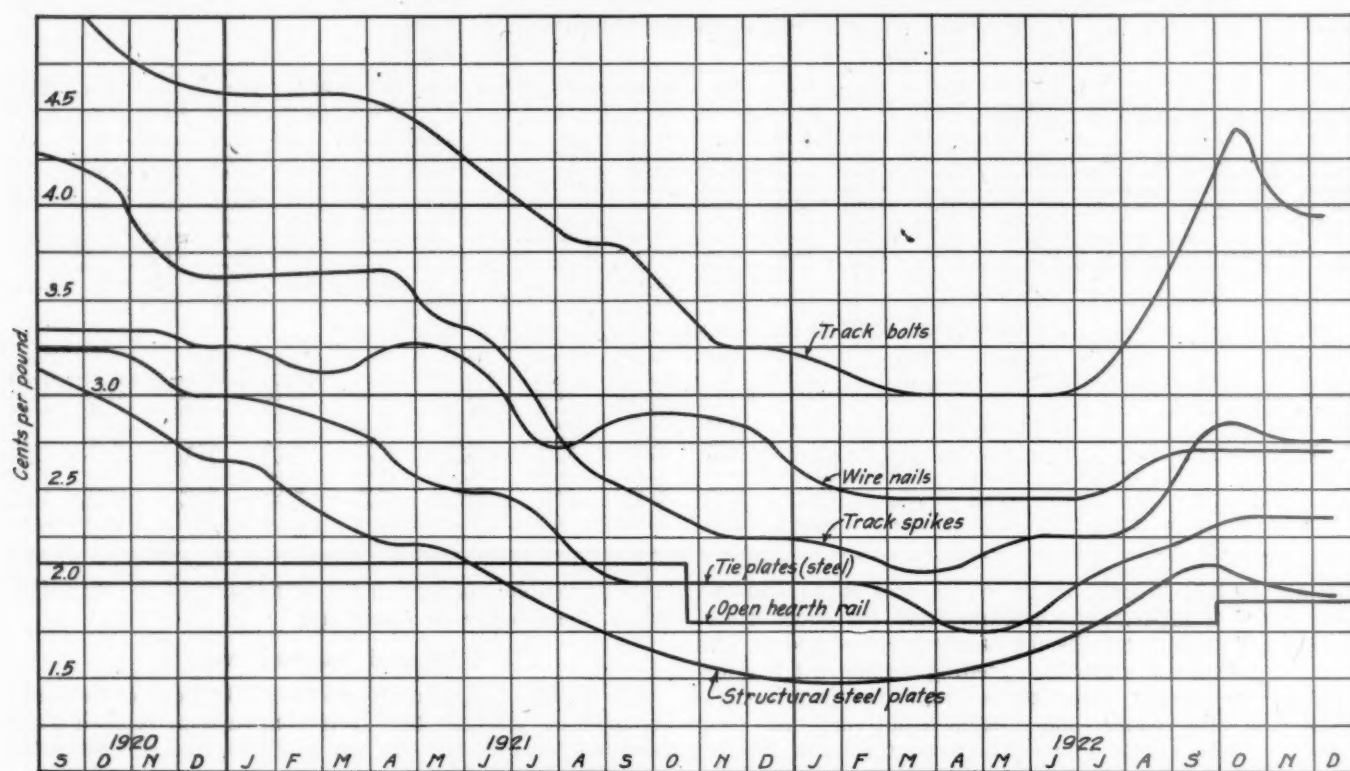
In an article on the subject which appeared two years ago,* the trend of equipment prices during the period of increase from 1914 to 1920, inclusive, was shown by index

*See the *Railway Age*, January 7, 1921, page 87.

numbers, using the average price during the period from 1910 to 1914, inclusive, as a base. These index numbers were prepared by the Presidents' Conference Committee on Federal Valuation after careful study of a mass of data furnished by the car and locomotive builders. These data formed the basis for a reliable comparison of the prices paid during each of the years of the 10-year period ending with

Locomotives, 251; freight cars, all-steel, 300; freight cars, composite wood and steel, 313; passenger coaches, all-steel, 218.

Last year a check of several quotations on comparable specifications for orders placed during the resumption of buying in November and December, indicated reductions from the 1920 prices varying from 45 to 50 per cent. These

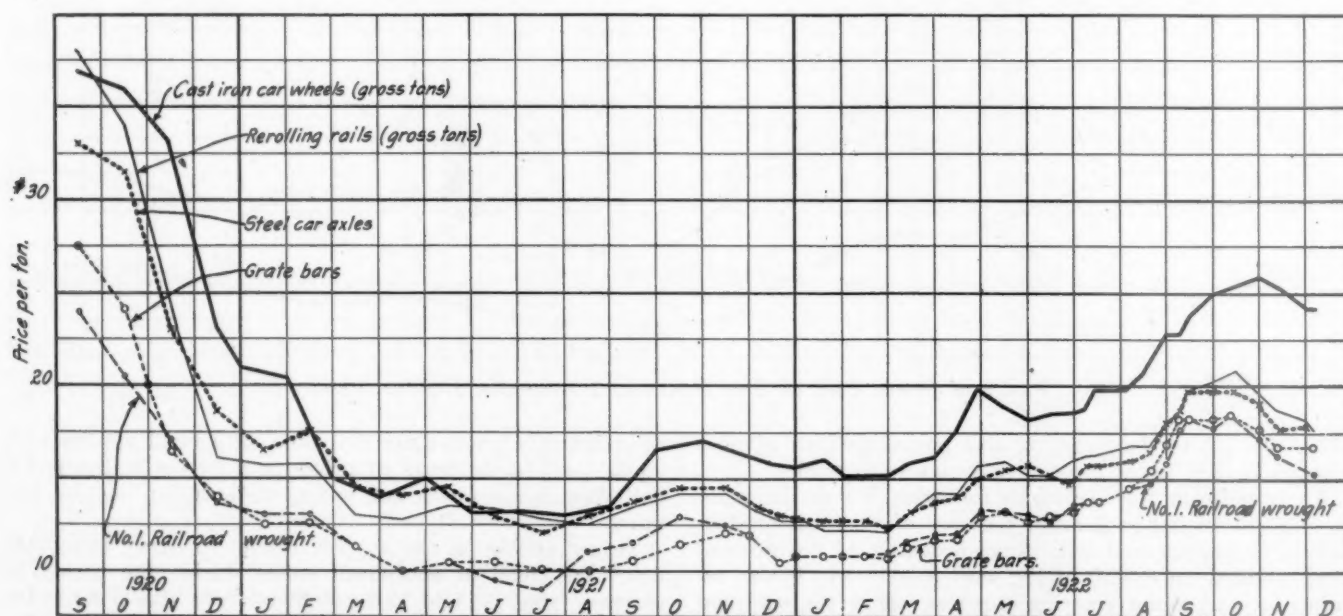


General Trend of Steel Prices on Items Applicable to Roadway and Structures

1920, but the studies have not yet been carried up to date. It is, therefore, impossible to show the trend of prices since that time with the same degree of accuracy.

Using 100 as the index number for the 1910 to 1914 average price, the Presidents' Conference Committee found that the peak prices of 1920 reached the following values:

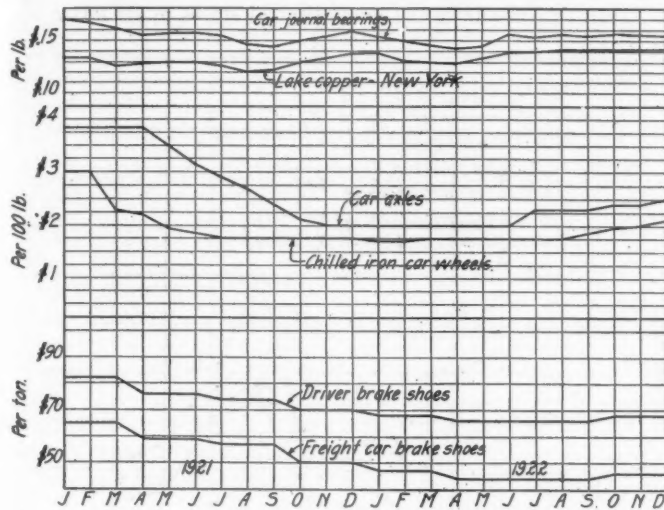
reductions were the result of two conditions: First, the decline in steel prices and, second, a keen competition for the limited amount of business offered, in order to keep organizations together and plants in operation. The conditions controlling at the close of 1921 continued well into last year and the market remained fairly steady at the low level



The Prices of Scrap Decreased Faster Than Those of New Materials

reached at the close of 1921 until the middle of the year.

Since then, with the increase in the volume of orders and in the prices of basic commodities, there has been a gradual increase in the prices quoted on locomotive inquiries with some indication of at least a temporary stabilization at pres-



Price Tendencies for Typical Equipment Items

ent levels. Locomotive prices at the present time are somewhat higher than those quoted on orders placed at the close of the year 1921 and present levels may be stated at approximately half-way between the high prices of 1920 and those reached at the bottom of the 1921 decline.

The course taken by freight car prices has been very much

prices of about 40 per cent, bringing the index number down to between 180 and 190. There has been an upward trend of prices on orders placed since the middle of last year, with the present market not quite equal to that prevailing at the end of 1921. As the volume of orders increases beyond the capacity of the builders for early delivery there is likely to be a further stiffening of prices.

Car and Locomotive Material

The 1921 price levels are well indicated by the tables of equipment orders included in this article in which are shown

DEPARTMENT OF COMMERCE
Typical Range of Lumber Prices

	1919 Average	1920 Average	Jan. 1922	July 1922	Oct. 1922
Hard Maple, No. 1, common.....	\$47.17	\$84.34	\$40.60	\$53.15	\$54.34
Western White Pine, 6 to 8, No. 1, common.....	38.20	53.64	47.43	57.64	48.88
Southern Red Cypress timbers, 12 by 12.....	48.61	72.50	38.67*	....	43.33
Douglas Fir No. 1, common, 1 by 8, 1 by 10.....	23.50	26.97	12.84	17.21	19.00
Douglas Fir No. 1, common rough 12 by 12, 10, 32 ft.....	24.43	29.57	17.44	22.33	22.50
Southern Pine No. 1, common 1 by 10.....	39.05	54.62	31.17	37.88	42.19
Southern Pine No. 1, common 12 by 12.....	36.03	47.14	25.91	31.45	34.49

*Price for October, 1921.

the prices to be paid for cars and locomotives, the purchase of which is financed through the issue of equipment trust certificates. The details concerning these orders are made public by the Interstate Commerce Commission at the time authority to issue the equipment trust certificates, required by Section 20-a of the Transportation Act, is granted the carriers.

On two of the charts are shown a number of finished ma-

LOCOMOTIVES

Road	No.	Type	Weight	Builder	Price		Reported in Railway Age	
					Each	Total	Order	Equipment Trust
Baltimore & Ohio.....	35	2-8-2	.....	Baldwin	\$51,500	\$1,802,500	July 15	Aug. 26
.....	15	4-6-2	.....	Baldwin	43,200	648,000	Aug. 5	Aug. 26
Boston & Maine.....	22	0-8-0	.....	American	32,400	712,800	Apr. 22	July 22
.....	2	0-8-8-0	.....	American	60,750	121,500	May 6	July 22
Central of New Jersey.....	25	2-8-2	.....	American	47,885	1,197,125	.....	June 3
Chicago & North Western.....	10	4-6-2	269,000 lb.	American	40,450	404,500	May 6	July 15
.....	20	2-8-2	304,000 lb.	American	42,800	856,000	May 6	July 13
.....	20	0-6-0	171,000 lb.	American	28,300	566,000	May 6	July 15
Chicago, Indianapolis & Louisville.	3	4-6-2	237,000 lb.	American	44,250	132,750	Sept. 9	Sept. 23
Chicago, Milwaukee & St. Paul....	4	2-8-2	294,000 lb.	American	45,200	180,800	Sept. 9	Sept. 23
Illinois Central.....	25	2-8-2	.....	Baldwin	36,535	913,375	Apr. 8	July 15
.....	25	2-10-2	.....	Lima	56,500	1,412,500	July 22	Oct. 14
.....	25	2-8-2	.....	American	42,400	1,060,000	July 22	Oct. 14
.....	15	0-8-0	.....	Baldwin	35,700	535,500	July 22	Oct. 14
Mobile & Ohio.....	10	2-8-2	.....	American	36,672	366,724	Apr. 15	June 10
Nashville, Chattanooga & St. Louis	4	2-8-2	.....	Baldwin	46,370	185,481	June 24	Oct. 21
.....	1	2-8-2	.....	Baldwin	46,170	46,170	June 24	Oct. 21
.....	2	4-8-2	.....	Baldwin	46,876	97,751	July 8	Oct. 21
.....	1	4-8-2	.....	Baldwin	46,676	46,676	July 8	Oct. 21
New York Central System, New York Central.....	90	2-8-2	340,000 lb.	{ American	72,000	6,480,000	July 29	Nov. 18
.....	40	2-8-2	340,000 lb.	{ Lima	76,700	3,068,000	Sept. 23	Nov. 18
.....	30	4-6-2	288,000 lb.	{ American	61,200	1,836,000	Sept. 23	Nov. 18
.....	30	0-8-0	.....	.....	32,200	966,000	.....	July 15
.....	20	0-8-0	.....	.....	32,200	644,000	.....	July 15
Big Four.....	50	2-8-2	340,000 lb.	{ American	71,800	3,590,000	July 29	Nov. 18
.....	15	4-6-2	288,000 lb.	{ American	61,000	915,000	Sept. 23	Nov. 18
.....	15	0-8-0	.....	.....	32,200	483,000	.....	July 15
Michigan Central.....	10	2-8-2	340,000 lb.	{ American	72,000	720,000	July 29	Nov. 18
.....	5	4-6-2	288,000 lb.	{ American	61,200	306,000	Sept. 23	Nov. 18
.....	10	0-8-0	.....	.....	32,200	322,000	.....	July 15
.....	15	4-8-2	.....	Baldwin	58,000	870,000	Sept. 16	Oct. 28
St. Louis-San Francisco.....	35	2-8-2	.....	Baldwin	55,000	1,925,000	Sept. 16	Oct. 28
.....	6	Boosters	.....	.....	8,350	50,100	Sept. 16	Oct. 28
Texas & Pacific.....	8	4-6-2	281,000 lb.	American	63,700	509,000	Sept. 23	Nov. 4
.....	8	0-6-0	164,000 lb.	American	32,000	256,000	Sept. 23	Nov. 4
Western Maryland.....	10	2-8-0	.....	Baldwin	60,000	600,000	Sept. 16	Nov. 11

the same during the past year as that of locomotive prices. Prices being quoted on freight car orders placed at the close of 1921 were averaging approximately 30 per cent lower than the top prices of 1920, bringing the index number down from 300, and over, to about 215. The bottom was reached in February or March, with a total decline from the top

materials used extensively in the maintenance of cars and locomotives. Several of these items are not subject to uniform quotations, each railroad making its own contract as to price. In such cases the curves represent what may be considered an average figure sufficiently accurate to indicate the trend during the year. It will be seen that in most cases the price

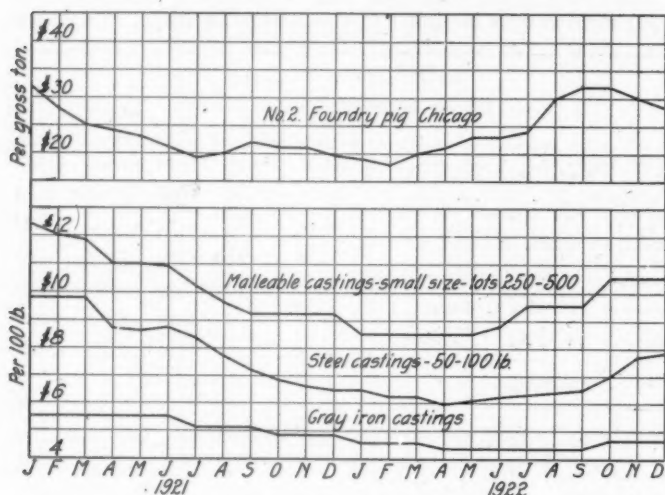
trends for these articles are approximately parallel to those of the basic commodities entering into their construction.

Cross-Tie Production Limited

The present status of the tie market is affected by influences that go back as far as the break in the lumber market in the fall and winter of 1920. This led to such a flood of deliveries that many of the roads were compelled to accept stocks of ties far in excess of their requirements, resulting

with a corresponding increase in prices. A good cotton crop, an active lumber market and a generally greater demand for labor, have all had an influence in curtailing an interest in tie cutting on the part of a great many men who would normally be engaged in this work and this also has had its influence on prices.

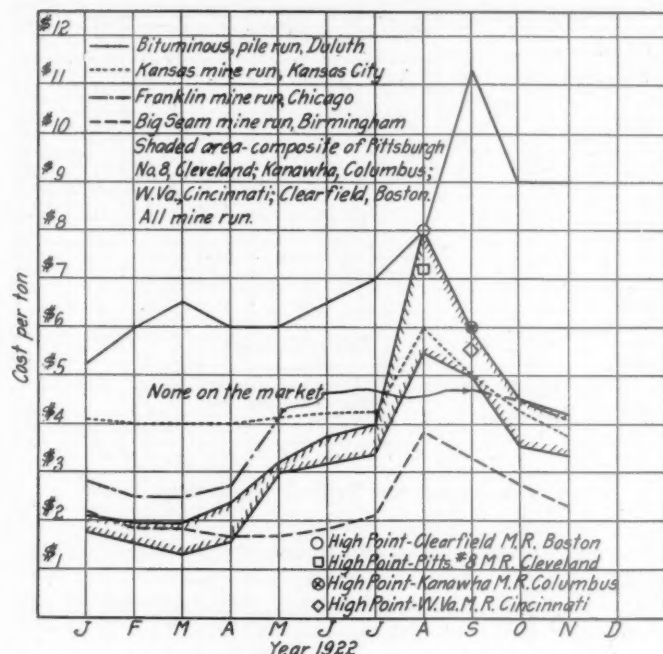
Several railroads in the north central states made advances



Range of Prices for Materials Used by the Mechanical Department

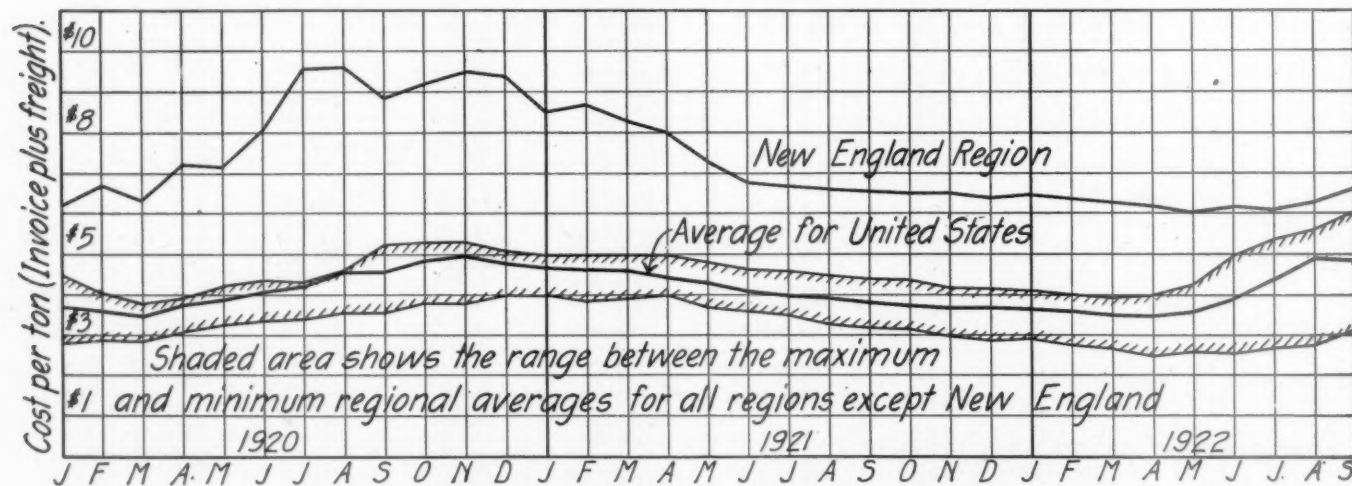
in a long period during which many of the stronger roads were virtually out of the tie market, while the purchases on the part of the remaining roads were not enough to produce a fair demand during any part of 1921. This is indicated by the fact that production of cross-ties during that year has been estimated at one-half to one-quarter of normal. Toward the close of that year, further withdrawals from the market resulted in a further shrinkage in demand so that the winter of 1921 and 1922 found tie production on the lowest basis in years.

With the advent of spring, there was some restoration of



Trend of Spot Coal Prices During the Past Year

during the last five months of from 7 to 10 cents in the prices paid for ties delivered along the right-of-way, but it is questioned in some quarters whether this advance is sufficient to secure the required volume of production. In the southwest the tie contractors are now paying from 10 to 15 cents more for ties than in July. Sawed ties in one section of the northwest now cost nearly 30 per cent more than in May, 1922, and 40 per cent more than in June, 1921. Another discour-



How the Cost of Railway Coal Has Varied for the Past Three Years

business, but tie purchases continued below normal and were decidedly spasmodic in character. Later in the year restrictions on the use of cars for handling company materials interfered seriously with the movement of ties. This policy of reduced tie purchases greatly reduced the stocks and resulted in a greater interest in tie purchases during recent months

agement to production which must not be overlooked was the fixing of prices by many of the railroads at figures which have not made production profitable.

The net result of these conditions is that some of the roads will probably encounter some difficulty in securing their tie requirements for 1923 and will also pay considerably higher

prices for them than would have been the case if tie purchases had been distributed more uniformly throughout the last 12 months.

Trend of Coal Prices

That the recent coal strike has been extremely costly to the railroad is clearly indicated by the chart showing the trend of prices during the past three years. For the railroads of the United States as a whole, the average cost of the coal used in August and September was about 30 cents a ton greater than the peak prices paid during the same months of 1920. Considering the fact that the cost to the New England roads was from \$2.30 to \$3.30 below that prevailing during these same months in 1920, it is evident that the relative conditions in some other parts of the country are even worse than the comparison of the average prices for the country as a whole would indicate. During the nine months of last year for which data are available, the average monthly cost to the New England roads shows a variation of 59 cents a ton, while the average for the country as a whole has been \$1.39 per ton. The roads suffering the most were those in the Great Lakes and the Northwestern regions. From a low cost for the year of \$3.86 a ton, which was the average for the month of March, the cost in the Great Lakes region reached an average of \$6.01 in September, an increase of 56 per cent. In the Northwestern region the low average of \$3.90 a ton also came in March. The cost in this region in-

creased 40 per cent to a maximum of \$5.46 a ton in August, which was followed by a slight decline to \$5.39 a ton for September.

The regions least seriously affected by the disturbed market conditions were the Pocahontas and the Southern. The average cost of coal used by the roads in the Pocahontas region reached the lowest point of the year in the month of April. From this low average of \$2.44 a ton the price had increased to \$3.22 in September, a 32 per cent increase. The range for the Southern region was from a minimum average of \$3.01 in June to \$3.12 in September. This was much lower than the average cost for January, which was \$3.40 per ton. In no other region, however, was the cost in September lower than that at the beginning of the year.

An interesting comparison with the average cost of railroad coal is presented by the composite diagram of spot coal prices in a number of markets. Prices in these markets show a marked increase in April and May which was checked during June and July, only to skyrocket in August. Prices in September were still high, in some cases slightly higher than those in August, but as the result of the general resumption of production in the union mines late in August, prices retreated sharply in October and by November had generally returned to levels but little above those prevailing in July. Several notable exceptions to the range of markets shown by the shaded area are shown separately on the chart, giving the trend of spot coal prices.

Status of Railroad Accounts with the Government

Railroad Administration Expects to Complete Settlements This Year. Progress Made in Adjustment of Guaranty

CONSIDERABLE PROGRESS has been made during the year in settling the complicated accounts between the railroad companies and the federal government arising from the government control of their properties during 26 months of the war and post-war period and the guaranty for the six following months before their rates could be adjusted to a self-sustaining basis. Although 34 months have elapsed since the roads were relinquished by the government some substantial sums are still unadjusted and therefore unpaid.

Accounts with the Railroad Administration

Of the 241,194 miles of road taken over by the government, roads operating 178,045 miles had effected final settlement with the Railroad Administration up to December 1. Roads operating 236,856 miles had filed claims for \$960,149,591, and, on this basis, the total claims for all the roads are estimated at about \$978,000,000. There is an aggregate of 4,338 miles of road for which claims have not, as yet, been filed.

The foregoing statement does not include the claims of short line roads. The definite rules governing the adjustment with short lines have not, as yet, been agreed upon, and the rights of the short line companies are now before the courts.

Claims to the amount of \$676,261,854 had been settled by the payment of a net amount of \$162,403,040. The settlements made amount in number to 286, and include 427 federally controlled carriers, consisting, as above stated, of 178,045 miles of road. It should be noted that the relation between the claims and the net amount paid in this statement does not represent the proportion in which the total claims of the railroads have been reduced in settlement be-

cause the \$676,000,000 referred to merely represents the balance after many payments had been made previously on account.

On the basis of the settlements heretofore made, the additional net amount that would be paid to federally controlled carriers in settlement of their claims would be approximately \$80,000,000. This would not include settlements with short lines nor payments of claims of third persons against the Railroad Administration, nor advances that might be made for funding additions and betterments to the roads not yet settled with.

As of December 1, the Railroad Administration held definitive obligations of carriers in the principal amount of \$198,365,400, of which \$39,501,000 consisted of equipment trust notes. It is the expectation of the Railroad Administration that by June 30, 1923, every company whose property was under active federal control during the federal control period will have had a hearing, and, unless there is litigation between the carriers and the government, the claims of the railroad companies will be adjusted. Up to December 1, 1922, but one Class I company had definitely refused to make an adjustment and resorted to hearing before referees, as provided for by the Transportation Act.

In the judgment of officials of the Railroad Administration, there are sufficient funds to its credit so that no additional appropriation by Congress will be required to complete its liquidation, because it has realized over \$300,000,000 during the last year and a half by disposing of most of the equipment trust certificates which it received for the cars and locomotives ordered during federal control.

In a statement submitted to the Senate committee on interstate commerce, which has just been published in connection with a report of hearings before that committee, Di-

rector General Davis estimated that in the settlements concluded up to September 1, which represented 69.4 per cent of the mileage under federal control, there had been allowed on account of under-maintenance of way and structures and under-maintenance of equipment a total of \$125,428,809 on claims under those accounts of \$422,837,676. Assuming that the same proportion will be paid or accounted for in the settlements yet to be made, he estimated that there would be additional undermaintenance claims amounting to \$14,193,536 and adding these to the claims on which there had been no adjustment he estimated that \$97,167,663 would be allowed for undermaintenance on claims amounting to \$294,007,585. His summary of the undermaintenance situation, including past allowances and probable future allowance, was as follows:

	Maintenance of way and structures	Maintenance of equipment	Total
Total maintenance claims settled to Sept. 1, 1922	\$185,946,870.44	\$236,890,806.01	\$422,837,676.45
Total maintenance claims yet to be settled.....	159,235,146.01	134,772,439.05	294,007,585.06
Total maintenance claims filed and expected	\$345,182,016.45	\$371,663,245.06	\$716,845,261.51
Total amount paid in final settlement to Sept. 1, 1922	\$92,760,674.95	\$32,668,134.71	\$125,428,809.66
Estimated amount yet to be paid in settlement..	78,582,544.56	18,585,119.34	97,167,663.90
Total	\$171,343,219.51	\$51,253,254.05	\$222,596,472.56

Six-Months' Guaranty

A year ago a considerable amount was still due the carriers on account of the guaranty for the continuation of the standard return for the six-months' period following the period of federal control. While approximately \$600,000,000 was claimed by the carriers, the Interstate Commerce Commission last year estimated the amount necessary to make good the guaranty as approximately \$536,000,000 and in its recent annual report said it found no occasion to change the estimate. As of October 31, the commission estimated that \$85,926,954 was still due the carriers and payments since have not substantially changed the amount. The total payments certified by the commission up to that date amounted to \$450,073,045, of which \$263,935,874 had been paid as advances, \$168,970,412 as partial payments under the amendment to the law adopted in 1921, and \$17,166,759 in final settlement. Settlements had been effected with 119 carriers and 75 cases had been dismissed, as the respective companies were not considered by the commission to be entitled to the benefits of the guaranty. By their returns filed in response to the commission's order of October 18, 1920, 547 of the 667 carriers that accepted the guaranty provisions of the Transportation Act claimed an amount approximating \$818,000,000, but after the commission's decision of December 15, 1921, that it would not recognize some of the elements for which the carriers contended that allowances should be made, chiefly the alleged inefficiency of labor, 578 carriers filed returns making claims amounting to \$600,000,000. The commission is endeavoring to effect settlements in the order in which these returns were filed.

Claims of Short Lines

On claims of short line railroads for reimbursement for their losses resulting from federal control, although they were relinquished, the commission has certified approximately \$5,000,000 and it estimates the amount still to be paid at about \$10,000,000. Three hundred and forty-four carriers had filed claims under Section 204 of the Transportation Act, for a total of approximately \$25,000,000.

Loan Fund

The loan fund of \$300,000,000 provided by Section 210 of the Transportation Act had been increased by the date of the commission's annual report to \$420,109,367 by ac-

rued interest (at six per cent) and by repayments. The commission has reserved \$40,000,000 to cover claims and judgments arising out of federal control as provided by the statute and it had certified loans amounting to \$326,152,667, of which \$317,886,667 had been paid by the Treasury up to November 30. The unencumbered balance as stated in the commission's report was \$53,601,700, but under the law loans have been confined to applications made prior to February 28, 1922. The aggregate amount of loans requested in pending applications filed prior to that date is large but the commission has made very few new loans since that date and does not now expect to make any substantial amount of new loans. Repayments on loans had been made by November 30 by 37 companies to the amount of \$99,339,985.

Total payments made by the Treasury at the date of its last report under various sections of the Transportation Act (exclusive of payments by the director general) have been as follows:

(a) Under Section 204, as amended by Section 212 for reimbursement of deficits during federal control:	
(1) Final payments, including partial payments previously made.....	\$4,142,914.15
(2) Partial payments to carriers as to which a certificate for final payment has not been received by the Treasury from the Interstate Commerce Commission	\$1,079,502.34
Total payments account reimbursement of deficits	\$5,222,416.49
(b) Under Section 209, as amended by Section 212 for guaranty in respect to railway operating income for first six months after federal control:	
(1) Final payments, including advances and partial payments previously made.....	\$111,245,533.63
(2) Advances to carriers as to which a certificate for final payment has not been received by the Treasury from the Interstate Commerce Commission.....	\$212,965,672.00
(3) Partial payments to carriers as to which a certificate for final payment has not been received, as stated above.....	\$126,494,722.09
Total payments account of said guaranty.....	\$450,705,927.72
(c) Under Section 210 for loans from the revolving fund of \$300,000,000 therein provided	
	\$317,886,667.00
Total	\$773,815,011.21

According to a recent statement by the Treasury Department, the government held railroad securities to the amount of \$457,938,000 on September 1, including \$40,320,000 of equipment trust certificates and \$231,876,468 as collateral for loans under Section 210. Of \$204,794,520 advanced to railroads by the War Finance Corporation, all but about five per cent has been repaid.

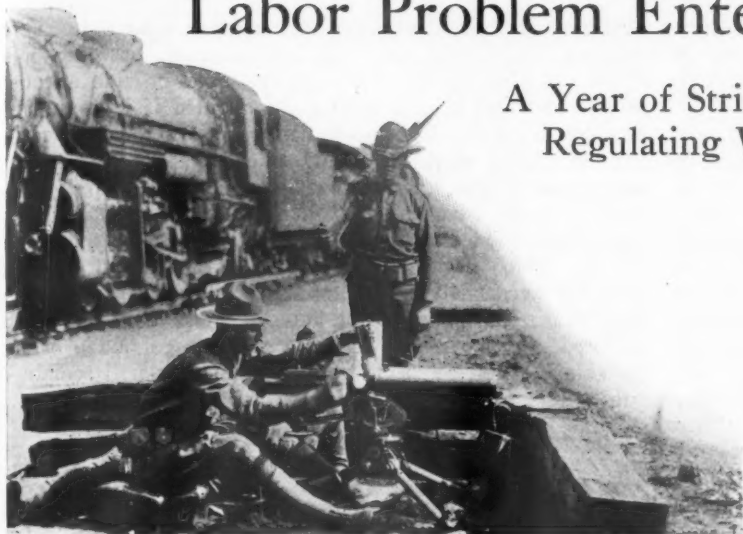


South Station, Vienna

Labor Problem Enters the Political Arena

A Year of Strife Focuses Attention on Means of Regulating Wages and Working Conditions

By Holcombe Parkes



Troops Guarding Railway Property

After the most turbulent year in history, the future of the railroad labor problem depends upon the extent to which the lessons of the past twelve months are capitalized by all concerned.

These lessons are contained mainly in the strike of shopmen, and the failure of the labor provisions of the Transportation Act.

The coming year promises much discussion but little action comparable to the unfortunate developments of 1922.

ONE OF THE MOST turbulent years in railroad history, insofar as the relations between the carriers and their employees are concerned, comes to an end in seeming peace and quiet. For a while at least the constant strife, brought about by the inevitable period of readjustment, seems to have subsided. He would be a super-optimist who would say that permanent harmony is near. On the other hand he would be blind who could not look back during this lull and see something of the fundamental lessons to be learned from the unfortunate developments of the last 12 months. The future of the railroad labor problem depends upon the extent to which these lessons are capitalized by the employees, the railroads, the government and the public.

The story of the year's events has been fully told in the weekly issues of the *Railway Age*. Repetition at this time would only serve to crowd out that portion of the review which might be of value in facing another year. It will be the aim of this article, therefore, to deal with events only in a general way, placing emphasis on such conclusions and deductions as may be helpful in the future.

There have been seven major developments during the year, all of which are closely related to the big event—the first great general strike of any class of railway employees—and all of which will have a great deal of influence on the future railroad labor problem.

These developments are:

1. The downward revision of wages and the partial elimination of many onerous working rules.
2. The failure of the shopmen's strike.
3. The seeming failure of the labor provisions of the Transportation Act to put an end to conflicts between the

railroads and their employees, the expressed hope of the framers of the Act.

4. The growth of a firmer government policy toward railroad labor problems.

5. The return to system or regional negotiation, instead of national bargaining, and the establishment of company unions.

6. The losses in power and prestige sustained by the national railway labor organizations.

7. The beginning of an upward readjustment of wage scales.

The Revision of Wages and Working Conditions

In discussing labor developments during 1921 in the *Railway Age* of January 7, 1922, page 31, it was stated that "the year 1922 promises to be another year of wrangling and struggle." It was that and more.

During the first two months of the year the Railroad Labor Board promulgated new rules and working conditions for several large classes of employees. Certain of these new regulations were admittedly intended to eliminate some of the wasteful and restrictive situations brought about through the application of the rules of the various national agreements. Of course, these rulings were not received gratefully by the employees involved. From the railroad viewpoint the new rules in many cases were welcomed because they did represent at least something better than the labor-written agreements previously in effect as a heritage of federal control.

Again in reviewing the closing days of 1921, in the *Railway Age* of January 7, 1922, it was stated, "a further readjustment of wage scales is imminent." This prediction materialized on March 7 when the carriers came before the Labor Board asking for a reduction in the wages of practically all of their employees, with the exception of those engaged in train service, on the grounds that the cost of living had decreased and wages for comparable work in other industries had fallen materially. The employees sparred for time, finally countering with demands for a "living wage" based on a hypothetical budget for a hypothetical family of five; the same "living wage" theory which subsequently played an important part in all of the developments of the year and which has been carried over into the present year as a bone of contention over which the carriers, the employees, the government and the public, can wrangle for some time to come.

It was at this stage that the national leaders of the shop employees first disclosed the views and motives which later led them into a disastrous strike. B. M. Jewell, president of the Railway Employees' department of the American Federation of Labor and the recognized leader of the shopmen, said very frankly:

"We come here to challenge the wage rates of all productive labor, to challenge the very principle (cost of living and comparison with wages in other industries) upon which the railroads propose that rates of pay be adjusted. We propose to show how the entire purpose for which industry is operated can and must be changed."

The Labor Board was flooded for about two months with

a mass of data, statistics and economic analyses of every conceivable description. Its decision was handed down in sections, comparatively small reductions becoming effective on July 1.

The existence of a body such as the Labor Board to rule on disputes involving wages and working rules materially helped to make these changes possible. Practically all of the board's rulings mentioned thus far were handed down with the entire approval of all three public members. Nevertheless the board's work met with greater and greater dissatisfaction on the part of the employees and it soon became apparent that if the constant criticism of the board and its awards were to be continued and the employees' propaganda against the whole system under which the railroads operate were kept up incessantly, as it had been previous to this time, some action which would be far-reaching in its effect either upon the railroads or the employees' organizations, would inevitably result.

What actually did happen will be discussed in later paragraphs. It is only necessary, in this connection, to point out that criticism by the employees and their authorized representatives of everything connected with the existing system of railroad operation and regulation has not ceased. In looking forward into the coming year more trouble is in sight until those who are carrying on this propaganda realize that it cannot continue indefinitely without producing an attitude on the part of the men which will surely result in near-sighted, ill-advised action, wholly detrimental to their own best interests.

Failure of the First General Strike

The Board's wage reduction order had hardly been announced when threats of a nation-wide strike of the employees involved were broadcast. Following the course of developments of this character, the employees' representatives attempted first to get their case before the public through the medium of the press and second to appeal to the President and to Congress, hoping to force governmental intervention to stave off "the great disaster" which threatened the transportation systems of the country. But on this occasion conditions were somewhat different from what they had ever been before. The Labor Board, a governmental agency, was in existence for the express purpose of preventing such conflicts. In this case it was the government. The President and several other governmental officers simply stated this patent fact. But the employees had been continually denouncing the Labor Board and its policies. So when the Board intervened, the shopmen, through their leader, Mr. Jewell, openly flouted its authority. The leaders of the other organizations involved, the maintenance-of-way, clerks and signal men's unions, wisely refused to order a walkout.

The history of this first great strike of any class of railway employees is too well known to necessitate repetition at this time. It ran along for almost two months, ending by agreement on a few roads and collapsing on the majority as the shop organizations were rebuilt.

For many years railway employees have been threatening to call a general strike, railway executives have been pondering the exact effect of such a walkout, the government has been studying the legal aspects and preparing for every emergency that might arise, and the public has been constantly worried about its effects upon commerce and the country generally. The answer has been found in this disastrous strike of shopmen. All railroad employees must know now that a strike of any one class of men, however large, or even of several classes, except those engaged in actually handling and moving trains, does not necessarily mean immediate paralysis of the transportation system; and that such a strike can be defeated. Railway executives know, too, that it is possible to meet emergencies of this kind if they arise. But they know at the same time that it is a costly

business, that it does have detrimental effects upon the industry, the plant and the organization, showing most clearly in the ability of the railroads to provide adequate service and that it is a thing to be avoided if it is humanly possible to do so. The government has been forced to translate its studies of the legal aspects of a strike into definite action and it has learned that it can and must protect the public's right to uninterrupted transportation. Lastly, the public has learned that while a great railroad strike, such as the one which began in July, is unfortunate and costly, it does not necessarily mean immediate starvation and industrial chaos, as some of the labor leaders have repeatedly declared. These lessons will not only be carried over into the coming year, but it is probable that they will remain as guide-posts to everyone concerned for many years to come.

Work of Railroad Labor Board

and Future of That Body

The third major development of the year is the seeming failure of the labor provisions of the Transportation Act to accomplish the purpose for which they were formulated, namely, the elimination of strikes which threatened to interrupt transportation. In the beginning the railway labor organizations opposed the creation of an arbitration body such as the Labor Board and at no time in its history have they been in favor of it. Particularly in the last year, since the necessity rose for the downward readjustment of wartime wage scales, they have bitterly denounced not only the principle upon which the board is founded, but its membership, its methods and its rulings. The shopmen's strike, called as a protest against the rulings of the board, represented the materialization of this opposition.

In reviewing the labor problem of 1921 the *Railway Age* of January 7, page 35, said: "The future of the Labor Board is dependent upon its accomplishments." The accomplishments of the board during the past year have forced the conclusion upon a great many, particularly government officers in Washington, that, constituted as it is constituted and functioning as it must necessarily function under the terms of the existing law, it cannot accomplish the high purposes for which it was created. Certainly the board in its present form is doomed; but it may have at least a year's lease of life before Congress can get to consideration of this problem.

The criticism of the board which has developed during the past year has been based on two things, namely, the lack of co-ordination between the Interstate Commerce Commission and the board, the one regulating the income of the railroads and the other a good part of the outgo; and second, the inclusion of six partisan members on the board, which, in the words of the President, makes it "inevitable that the partisan viewpoint is maintained throughout hearings and in decisions handed down." This criticism is reflected in the ranks of both the carriers and employees, in the attitude of a goodly part of the public and by the President, who has recommended to Congress that the board be made a part of the Interstate Commerce Commission and that its membership be composed exclusively of men representing the public. It appears probable at this time that no legislative action of this kind will be taken during the present session of Congress, but it is entirely probable that the coming year will see a reorganization of the government's arbitration machinery. The result of this reorganization may be expected to have a far-reaching effect upon the developments which may come within the next 12 months.

In fairness to the Labor Board it should be pointed out that the seeming failure of the labor provisions of the Transportation Act is not primarily due to the work of that body or of the individual members thereof. The fact that the board has met with a great deal of criticism from all sides and that it has, in one signal instance, failed to prevent a

nation-wide strike of railway employees and in several other instances been unable to prevent disregard of its decisions by a few carriers, has been due largely to omissions and generalizations in the law under which it operates.

Development of Government's Attitude

Toward Strikes and Strikers

The fourth major development of the year, the growth of a firmer policy on the part of the government toward railroad labor problems, is another result of the shopmen's strike. It has come to the front largely because of the existence of a governmental agency against which these employees struck and which had to be upheld as an essential part of our present regulatory system. Therefore, when the employees appealed to the President, to Congress and to the people there was nothing to do but to refer the dissatisfaction to the board. The shopmen's refusal to do this and the resultant strike immediately raised the question of whether or not the government had the power to, or could, protect the public's interest in an uninterrupted transportation service. The government's answer was the now famous Daugherty injunction, which forbade the strikers from interfering in any way with interstate transportation, and the numerous statements made by the President and other government officers, all of which left no doubt as to their trend of thought.

The government was obviously fully aware of its duty to the public to do everything within its power to prevent interruptions to service and of its rights and limitations in carrying out this duty. Consequently there is every indication that the future will see a firmer attitude toward disturbances of this kind and the increased participation of the government in the settlement of controversies before they reach the stage of open breaks. In other words it is probable that if new governmental machinery is created to handle questions in dispute between the carriers and their employees it will have not only the power to intervene and decide disputes, but authority to enforce its decisions upon employer and employee alike.

Trend Toward Company Unions and

Regional Negotiations

After the railroads had rebuilt their shop forces with new men or with strikers who were willing to return to work under the conditions established by the railroads, it became necessary to form organizations of these men with which the managements could negotiate wage scales, rules and working conditions. The practice of creating what are erroneously called "company unions" and which are, in reality, simply labor organizations of the men on each system, sprang up. This was the logical result of the gradual collapse of the strike and of the Labor Board's ruling which specifically gave the employees taking the place of the strikers the right to organize new unions of their own.

The strike was but two weeks old when reports of the intention of the new shopmen to take advantage of this order and form their own labor unions began to be made. For a month after the end of the walkout, activity of this character continued with great vigor and by the end of the year shopmen on many roads had succeeded in setting up new organizations. Included in this list are the following:

Alabama & Vicksburg
Atchison, Topeka & Santa Fe
Atlantic Coast Line
Central of Georgia
Charleston & Western Carolina
Chicago & Alton
Chicago, Burlington & Quincy
Colorado & Southern
El Paso & Southwestern
Florida East Coast
Ft. Worth & Denver City
Wichita Valley
Great Northern
Gulf Coast Lines
Houston, Belt & Terminal
Gulf, Mobile & Northern
Illinois Central

International & Great Northern
Kansas City Southern
Kansas, Oklahoma & Gulf
Louisville & Nashville
Lehigh Valley
Nashville, Chat. & St. Louis
New York, N. H. & Hartford
St. Louis-San Francisco
Southern Pacific
Tennessee Central
Trinity & Brazos Valley
Union Pacific
Wabash
Spokane, Portland & Seattle
Missouri, Kansas & Texas
Denver & R. G. Western

Representing the shopmen on almost all of the roads in the country prior to the strike, the Railway Employees' Department of the American Federation of Labor can now claim to represent the shop employees on comparatively few carriers—those settling with the strikers under the terms of the "Willard-Jewell" agreement. This group of roads includes the following:

Baltimore & Ohio
Buffalo & Susquehanna
Buffalo, Rochester & Pittsburgh
Chesapeake & Ohio
Chicago & North Western
Cincinnati, Indianapolis & W.
Chicago, Milwaukee & St. Paul
Chicago, St. Paul, M. & O.
Cumberland & Pennsylvania

Ft. Smith & Western
Minnesota & International
Mobile & Ohio
New York Central
Pittsburgh & Western Virginia
Seaboard Air Line
Southern
Western Pacific

Accompanying this trend toward system unions is another toward the regionalization or localization of collective bargaining. The day of a "Conference Committee of Managers" representing the railroads of the country as one group before the Labor Board has gone, probably for good. The Association of Railway Executives has definitely abandoned its labor activities. Cases are handled before the Labor Board by representatives of the regional groups of roads, each presenting the contentions of the carriers in the section represented. Dealings with the train service organizations during the past year have been wholly on a regional basis. All in all the reaction from the national negotiations which featured federal control and the post-war period has developed rapidly during the last 12 months. Whether or not still greater localizations will take place during the present year is problematical, but it is hardly to be expected that much further progress will be made.

Labor Organizations Lose in Power and Prestige

The greatest example of the loss in power and prestige sustained by many of the railroad labor organizations involves the Federated Shop Crafts. Other organizations, including several of those which did not strike, have fared but slightly better. Throughout most of the year wage reductions have been talked of, ordered and put into effect. Changes in the rules and working conditions of several classes of employees have taken still more from the monthly pay envelope. Wages correspond more closely with the actual amount of service rendered. Punitive payments for time spent in idleness are rarer. All this has happened despite every effort of the organizations' leaders to stave off the inevitable. These factors, together with the employment of a much smaller number of men than formerly and the lessons of the shopmen's strike, have all tended to reduce materially the membership of many of the labor organizations.

Those who have continued to pay their dues are confronted with a great deal of dissension, not only between factions in the various organizations, but between the organizations themselves. Furthermore, the drastic action of the shopmen and the constant threatening of other groups has finally brought about an extremely unfavorable public opinion. "The public is sick and tired of strikes," Chairman B. W. Hooper, of the Labor Board has said; and this might accurately be expanded to include "threats of strikes." These developments have resulted in weakening the railroad labor organizations as they are now constituted. Evidences of such effects are not hard to find. It is doubtful, though, whether this can be considered more than a temporary slump, because the closing months of the year brought with them clear indications that the tide is turning. All in all organized railway labor has lost heavily during 1922 and the present year will undoubtedly witness strenuous efforts on the part of labor leaders to regain the lost ground.

Business Revival Brings Wage Increases

The business depression ended during the closing months of the year. Wage scales in other industries were gradually being increased. The cost of living seemingly reached the

end of its downward march. Given these conditions and the Labor Board's promise to take up the consideration of the justness and reasonableness of existing wage scales again, those classes of railway employees which wisely refrained from joining the shopmen in their gamble came before the board with pleas for wage increases. Probably because the increases in the wages for comparable work in other industries and in the cost of living were not great enough to justify the demands that the employees wanted to make, their arguments in these cases revolved largely about the "necessity for a living wage based upon American standards of health and decency." Obviously, under the terms of the Transportation Act, the Labor Board could not approve this principle as propounded by "expert" witnesses for the men, the essential point of difficulty being that the board in making its decision in this and other wage cases had already ordered what it considered a living wage but not the living wage fixed by the employees. Before the end of the year, however, wage increases were given to several classes of employees.

The Question of the Living Wage

Out of the discussion of these wage cases has arisen a problem which has already attracted the attention of many government officers, including the President, the framers of the Transportation Act and several of the cabinet officers. The "necessity for the living wage" is being made a political issue and therefore there is no question but that it will constitute one of the problems of the coming year. It will either have to be approved or completely discredited before lasting peace can be restored between the railroad managements and employees.

But little of this discussion of conditions prevailing in the ranks of labor organizations and regarding future developments applies to the train service brotherhoods. Throughout the year they have maintained a policy of dealing directly with the railroads through regional negotiation and keeping away from the Labor Board as much as possible. From their viewpoint they have been successful in stabilizing their wage rates and working conditions during the year.

Late in the year many of the railways made agreements with their conductors and trainmen under which their present wages and working conditions will be maintained for another year. Some railroads made similar agreements with their engineers and firemen. Practically the only subject left in dispute between the train service men and the railroads deals with their rules, particularly those involving the

subject of time and one-half for overtime in freight train service and these questions are scheduled to be heard before the board on January 15. It is unlikely, therefore, that the coming year will witness anything but a continuation of the cordial relations that have existed during the latter part of the last year.

Other Developments, and the Outlook for 1923

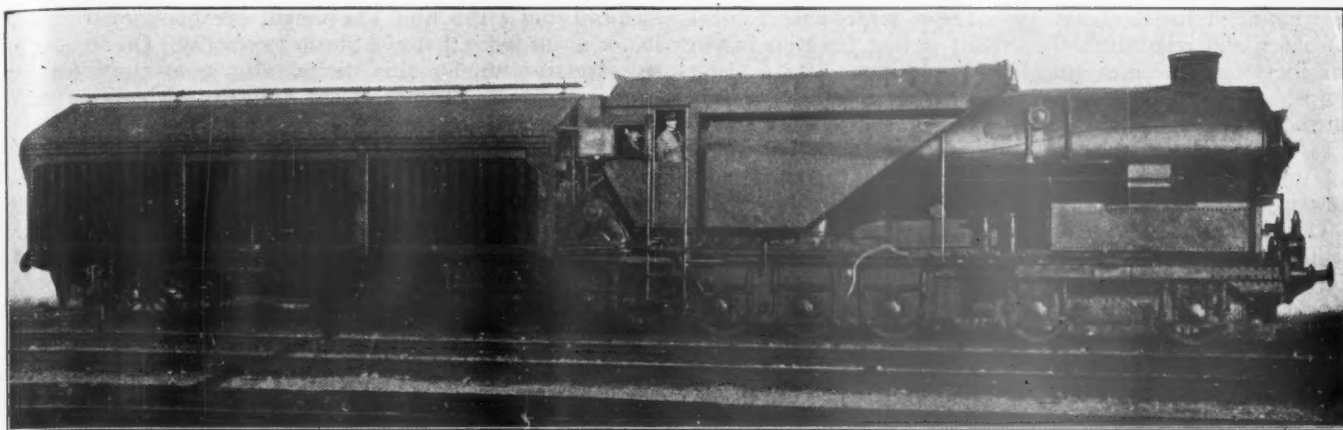
There have been many other developments during the past year which have helped to make railroad labor history. For instance, the legal controversy between the Pennsylvania and the Labor Board has gone through various changes and courts and is now before the Supreme Court of the United States. The Labor Board has rendered many decisions of far-reaching effect, among which might be mentioned its rulings on the practice of contracting for the operation of shops, the eight-hour day for yardmasters, etc. However, extended discussion of these developments has already been made in the columns of the *Railway Age* and although many of them will be carried over into the new year it is improbable that they will exert a major influence on future developments. For instance, all of the developments of the past year involving the authority and jurisdiction of the board will probably be solved automatically through the reorganization of the government's arbitration machinery. The practice of contracting may again become a live subject but the willingness of the railroads in almost all cases to abide by the board's opinions on this subject seem, at present at least, to make this improbable.

Washington the Place to Study 1923 Problems

If one were desirous of studying the railroad labor problem intensively during the coming year Washington would be the place from which to carry on this work. The whole problem, more than ever before, is dependent upon governmental and, therefore, political action. If Congress, in its possible consideration of the Transportation Act, gives proper consideration to the lessons contained in the developments of 1922 and earnestly tries to evolve something that will tend to steady the radical elements in the ranks of organized labor and at the same time be essentially fair to both railroad and employee, one can reasonably expect substantial progress toward a better understanding, increased efficiency and permanent peace. The year will undoubtedly bring a great deal of discussion, perhaps bitter at times; but anything resembling the discord and trouble of the last 12 months seems highly improbable.



The Past and Present in Coal Cars on the Reading



A Radical Departure from Conventional Design, the Ljungstrom Turbine Locomotive

A Year of Innovations in Locomotive Design

Steam Turbine Locomotives in Europe—Mechanical Drafting Receiving Increased Attention

By A. F. Stuebing

The best performance in this country during 1922 was made by a locomotive of straightforward design, the Union Pacific Mountain type, which developed 3,500 indicated horsepower.

The best performance in Europe was made by the Ljungstrom turbine locomotive, which uses only half as much coal as the conventional designs of modern motive power. If the power output of turbine or internal combustion locomotives can be increased, these more efficient prime movers may supersede the reciprocating engine.

Never before have so many radical designs been brought out. Three turbine locomotives are now in operation in Europe and internal combustion locomotives have recently been built in Canada and in Germany.

THE YEAR 1922 is likely to go down in history as marking one of the turning points of locomotive development. It has been notable because of the introduction of radically new types, such as turbine-driven and hydraulically-gear locomotives, and also because of the distinct tendency toward a departure from what has been considered standard in every-day equipment.

In the 93 years that have passed since Stephenson's Rocket was built, there have been remarkable changes in the details of locomotive design, but in spite of the enormous increase in the size and power of individual units, the essential features of the steam locomotive have remained the same. The multi-tubular boiler, reciprocating pistons and the strong draft induced by the exhaust steam were the features which made the Rocket a success. All these are duplicated, only on a larger scale, in modern locomotives the world over.

Occasionally in the past someone has tried to introduce locomotives operating on entirely new principles, as for example the internal combustion locomotive built by Dr. Rudolph Diesel in 1913, but never before have there been brought out at one time so many novel, even revolutionary, types as have been tried during the past year. Three turbine-driven locomotives are now in operation and two others are being built. Locomotives driven by internal combustion engines and hydraulic gearing are being tried in this country and abroad and small self-propelled units are being developed to a high degree. Does this mean that old types of motive power will gradually be displaced, or will the experiments make the position of the steam locomotive even more secure in the future? Probably it is too early for anyone to predict the outcome, but the new designs recently brought out are worthy of the closest attention by both mechanical and operating officers.

Ljungstrom Turbine Locomotive

Unquestionably, the most noteworthy locomotive brought out during the year is the turbine-driven condensing locomotive designed by Fredrik and Birger Ljungstrom and built by the Aktiebolaget Ljungstroms Angturbin, Stockholm, Sweden. In this epoch-making motive power unit all precedents in locomotive construction were discarded. The design represents the application of approved stationary power plant practice with every refinement that will reduce fuel consumption. The boiler generates steam at 285 lb. per sq. in. pressure and superheats it to a very high temperature. This steam is then used in a high-speed turbine to develop power to drive the locomotive. The exhaust steam instead of being discharged out of the stack to create draft is piped to a condenser, which serves the double purpose of maintaining a vacuum to improve the efficiency of the turbine and reclaiming the steam to be used again as feed-water. Three feed-water heaters are used, the supply of steam being taken mainly from the auxiliaries, including the boiler feed pump and the turbine-driven fan used to create draft. The heat in the front end gases is used to raise the temperature of the air supplied to the fire.

The design has been most carefully worked out from the

standpoint of fuel economy and also as regards mechanical efficiency and reliability. The result is that the Ljungstrom turbine locomotive uses only half as much coal for a given power output as the modern superheated steam locomotives on the Swedish railways. It is doubtful whether any reciprocating locomotive can be built at present that will equal the fuel economy of this turbine-driven unit. Certainly none now in service can approach its performance.

On account of the possibility of fuel saving, the adaptability of the turbine-driven locomotive to American conditions deserves careful attention. The Ljungstrom design develops 1,800 hp. and there is some question whether this could be very greatly increased within the practical limitations of size and weight. Typical modern American passenger and freight locomotives develop about 3,000 hp. If small turbine locomotives were to be used in this country, it would be necessary to increase the number of trains to handle a given traffic. This would be undesirable from an operating standpoint and would increase the unit cost of train crew wages and terminal expenses. The maintenance of the turbine locomotive is still an unknown factor, but it is unlikely that it would be less than that of a reciprocating locomotive of equal power. The first cost of the turbine-driven type would certainly be much greater. Despite the remarkable economy in fuel, it is doubtful whether a turbine locomotive would prove economical if all items of cost were considered. The Ljungstrom design seems to represent the

motors being 1,100 hp. The weight per horsepower is 243 lb., or about twice that of a steam locomotive. On account of its excessive weight, this design also seems unsuited for American service because of the difficulty of building sufficiently powerful units.

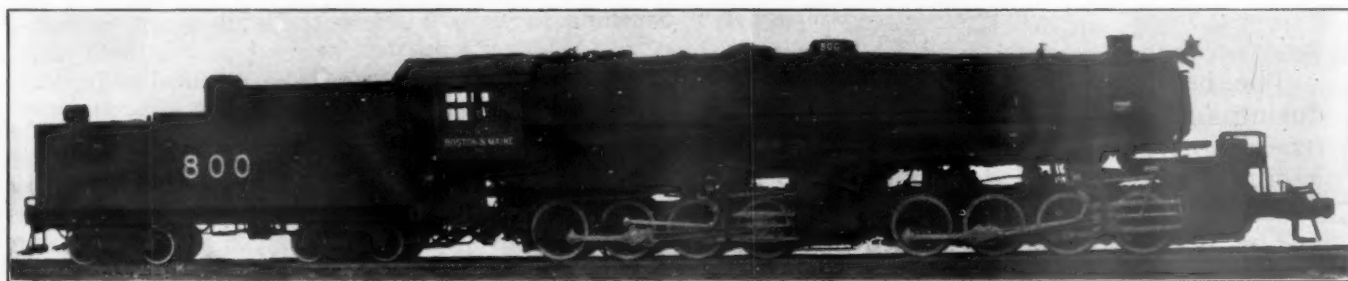
In addition to the three designs already mentioned, engineers in Italy and Germany are working on turbine locomotives. After all the different types have been thoroughly tested and tried in regular service, the present uncertainty as to the value of turbine locomotives should be dispelled.

Internal Combustion Locomotives

and Self-Propelled Cars

The use of small self-propelled cars in passenger service has been extended greatly during the past year. As is to be expected in any new equipment, the designs are changing rapidly. Most of the early cars were built with commercial truck engines which developed about 60 hp. It was found that these gave a rather small margin of reserve power and the tendency at present is toward larger engines developing from 120 to 150 hp.

There is no unanimity of opinion as to the practical limit of automotive type transmissions in railroad service. Driving through shifting gears does not seem to be satisfactory for heavy loads and to overcome this limitation hydraulic variable speed power transmission has been applied. A switching locomotive with the Waterbury variable speed gear



Mallet Type for the Boston & Maine, Built by the American Locomotive Company

highest development that is possible in the present state of the art. The future of the turbine locomotive in this country does not appear very promising unless some future development permits the use of more powerful units.

The Zoelly Turbine Locomotive

The firm of Escher Wyss & Co., Zurich, Switzerland, has built a locomotive with a geared turbine on the driving unit and a condenser on the tender. The general principle of operation is the same as the Ljungstrom locomotive, although it lacks some of the fuel-saving features of the Swedish design. While full details of the construction and operation have not been made public, it is doubtful whether this unit will equal the Ljungstrom locomotive in economy or capacity.

The Ramsay Turbo-Electric Locomotive

Another attempt to utilize the steam turbine for locomotive service has been made in Great Britain. Armstrong, Whitworth & Co. has built a locomotive with a turbine driving an 890 k.w. electric generator which furnishes power for four 275 hp. driving motors on the wheels. The locomotive has been placed in service on the London & North-western, where it is to undergo tests, and the records of its performance will probably soon be available.

The electric drive would probably give greater flexibility than the geared turbine drive, but the power losses in the electrical equipment are likely to be somewhat higher and it is doubtful whether the over-all efficiency will be as good as that of the Ljungstrom locomotive. This unit develops a maximum tractive force of 22,000 lb., the total rating of the

was built last year in Canada and a 120 hp. Diesel locomotive with the Lenz hydraulic transmission has been placed in service in Germany. It is not unlikely that from the modest beginning of the small self-propelled passenger car, internal combustion locomotives of considerable power will eventually be developed. A successful Diesel locomotive would reduce fuel consumption so greatly that it would almost revolutionize railroad operation. The outlook has never been as promising as it is now, for by the use of hydraulic transmission or by the Still system of applying steam pressure to the pistons of Diesel engines, the flexibility that is so necessary for locomotive service could probably be secured.

Recent American Designs

In appraising the locomotive situation it is quite essential to record not only the radically new and spectacular designs but also the important advances along the lines of conventional design. Probably the best record established by any locomotive during the year was that made by the Mountain type on the Union Pacific. In road tests this locomotive developed 3,500 indicated horsepower. This is the greatest power output for a simple locomotive ever recorded by the *Railway Age*. It amounts to one horsepower for each 98.6 lb. weight of the locomotive, which is a new record for road tests in this country. These results were obtained with a locomotive of straightforward design, not equipped with any special appliances. They demonstrate what can be accomplished with present day equipment by refinement in design.

Another locomotive which has created a great deal of comment is the Mikado type built for the Michigan Central. In

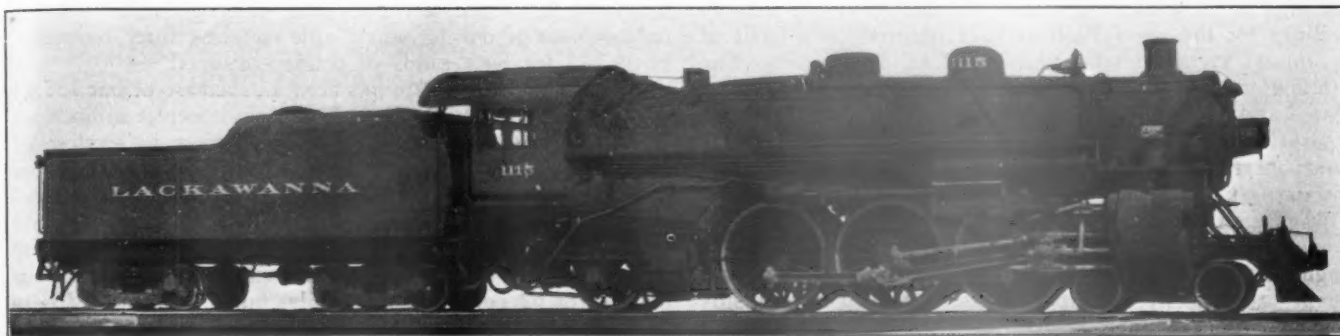
contrast with the Union Pacific design it is equipped with numerous appliances. Accurate records of the power output, fuel consumption, and cost of maintenance of this type will be awaited with interest as they will give an indication as to whether additional complication in construction is economical under present operating conditions.

A New Compound Locomotive

In recent years very few locomotives with compound cylinders have been built in this country. However, compounding is to be given another trial in a locomotive now being

equipped prior to 1922. The railroads have been watching the development and apparently they have now become convinced that feed-water heaters are economical devices, because 27½ per cent of the locomotives ordered during the last half of 1922 were equipped with apparatus for heating the feed-water, including feed-water heaters and exhaust injectors.

The past year has also seen greatly increased activity in the development of appliances for increasing the tractive effort of locomotives at starting and at low speed. The tender booster and the locomotive starter have been brought out



Latest Passenger Locomotive for the Lackawanna, Built by the American Locomotive Company

built for the Delaware & Hudson. This is to be equipped with a new type of boiler carrying 350 lb. steam pressure and a superheater designed for 300 degrees of superheat. The cylinders will be arranged on the cross-compound system with the high pressure cylinder on one side and the low pressure cylinder on the other.

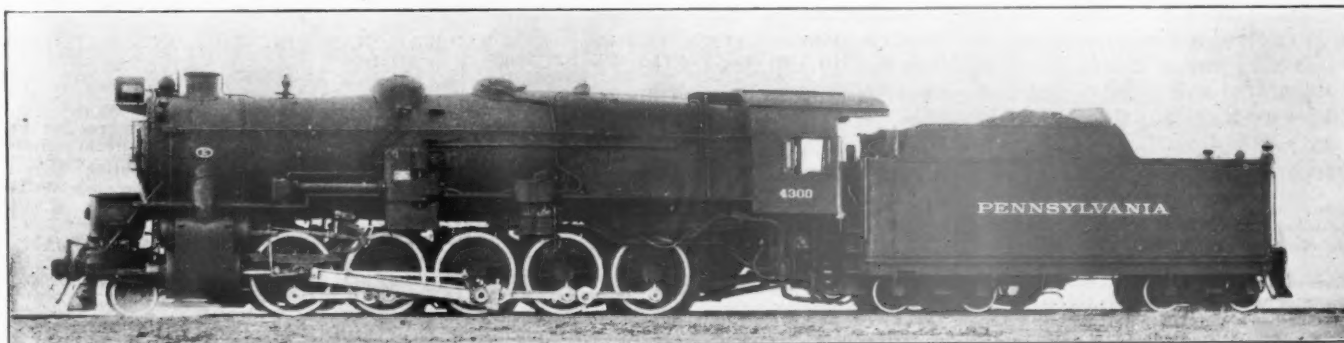
Mechanical Drafting of Locomotives

Many engineers believe that the method of producing draft by a jet of exhaust steam used in the locomotive is far from efficient, but little progress has been made in the develop-

during the past year and the trailer booster has been applied to practically 1,000 locomotives.

Other Locomotive Developments in Foreign Countries

The principal developments in motive power in other countries aside from turbine and internal combustion locomotives already mentioned are discussed in the articles on foreign railways appearing elsewhere in this issue. For that reason only a brief review of the situation will be given here. The general tendency in British and European locomotive practice seems to be toward the use of simple locomotives



A Highly Efficient Freight Locomotive, One of An Order of 100 Pennsylvania Decapods. Built by the Baldwin Locomotive Works

ment of other means for creating draft. During the past year experiments have been conducted with turbine driven exhaust fans both in this country and abroad. Up to the present time not enough work has been done to determine what savings can be effected by this method but the outlook seems promising. At a recent meeting of the American Society of Mechanical Engineers F. H. C. Coppus discussed the advantages of mechanical drafting in some detail. It is expected that the design proposed by Mr. Coppus will soon be tested and the feasibility and economy of mechanical drafting will be definitely determined.

Feed-Water Heaters Extensively Used

A great deal of attention has been given to feed-water heating for several years, but very few locomotives had been

and more general adoption of multiple cylinders, particularly the three-cylinder type. With the high steam pressures and large cylinders now used on two-cylinder locomotives, especially for freight service, very great forces are set up on the rods and bearings, resulting in a considerable increase in the cost of maintaining the machinery. The next logical step in locomotive design would be to reduce these forces by distributing them between a larger number of cylinders. The three-cylinder locomotive is not a complicated machine and would no doubt be readily accepted in this country as well as abroad but for the prevailing prejudice against the crank axle. It is probable if railroad men became familiar with the operation and maintenance of a three-cylinder type that they would find it no more troublesome than a two-cylinder locomotive of equal power.

I. C. C. Shows Figures of Rail Facilities Expansion

Annual Statistics for Year 1920 Include Comparisons by Decades—1890 to 1920, and Show Relation to 1890

ON PAGE 19 there appears an article entitled, "Railway Facilities Expansion Behind Traffic Growth." The article contains figures showing the percentage relationships of the growth of traffic and the growth of railway facilities for the years 1900 to 1921, figured on a basis of the annual average for the years 1902 to 1906 as 100. The information is also shown in chart form on page 22. The figures and the chart both show quite conclusively that for a period of several years the growth of railway traffic as shown in revenue ton-miles, and as especially shown in the various peak years, has increased in a ratio very much out of proportion to the increase in railway facilities as shown in such things as the number of locomotives, the number of freight cars, the total locomotive tractive effort, the total freight car capacity, multiple tracks, yard tracks and sidings, and property investment.

Further collaboration of the details shown in the article in question are contained in a table which appears in the volume recently issued by the Interstate Commerce Commission covering the statistics of the railways for the year ended December 31, 1920. This table, which is reproduced below, is entitled "Comparative Statement Showing Growth of Population and of Steam Railway Transportation and Facilities Therefor, United States by Decades from 1890 to 1920." The table shows a large compilation of various figures which are given for the years 1890, 1900, 1910 and 1920 with the percentages figured out showing the increases by decades and also the increases in each of the latter three decades over 1890.

The figures are given in the table but it may be pointed

out briefly that as compared with 1890 there has been an increase in ton-miles of 442.86 per cent, whereas there was an increase in passenger-miles of 299.82, or to use the commission's figures of ton-miles and passenger-miles equated on the basis of one passenger-mile equaling three ton-miles, of 397.37 for both kinds of traffic combined.

At the same time, there has been an increase of but 155.94 per cent in investment in road and equipment; an increase of only 123.10 per cent in total locomotives in service; of 142.66 for freight cars in service, and of only 108.78 per cent in passenger cars. The figures of tractive power of locomotives and of the total capacity of freight cars are not given for the years 1890 and 1900, but it is interesting to observe that in 1920 as compared with 1910 there was an increase of 62 per cent in ton-miles but an increase of only 49.89 per cent in locomotive tractive effort and of 31.04 per cent in total capacity of freight cars. It is believed that the table will be found of considerable interest.

In the statistics of 1920, the commission also includes a statement showing the increase in investment in road and equipment for the period 1912 to 1920 for the Class I and Class II roads combined. The figures are as follows:

Year ended	Investment during year
December 31, 1920.....	\$541,463,696
December 31, 1919.....	335,219,123
December 31, 1918.....	488,117,653
December 31, 1917.....	571,746,523
December 31, 1916.....	354,025,570
June 30, 1916.....	281,135,100
June 30, 1915.....	263,729,096
June 30, 1914.....	550,513,731
June 30, 1913.....	600,589,302
June 30, 1912.....	477,191,155

COMPARATIVE STATEMENT SHOWING GROWTH OF POPULATION AND OF STEAM RAILWAY TRANSPORTATION AND FACILITIES THEREFOR IN THE UNITED STATES, BY DECADES, 1890 TO 1920

	1890	1900	1910	1920
	Number or amount	Number or amount	Number or amount	Number or amount
		Per cent increase	Per cent increase	Per cent increase
		over 1890	during decade	during decade
			over 1890	over 1890
Population of the United States.....	62,947,714	75,994,575	91,972,266	105,710,620
Ton-miles	76,207,047,298	141,599,157,270	255,016,910,451	413,698,748,713
Ton-miles to each person.....	1,211	1,863	2,773	3,914
Passenger-miles	11,847,785,617	16,039,007,217	32,338,496,329	47,369,905,086
Passenger-miles per person.....	188	211	352	448
Ton-miles and passenger-miles equated.....	111,750,404,149	189,716,178,921	352,032,399,438	555,808,466,371
(1 passenger-mile = 3 ton-miles)				
Investment in road and equipment.....	\$7,755,387,381	\$10,263,313,400	\$14,557,816,099	\$19,849,451,638
Investment per mile of road.....	\$50,635	\$56,567	\$64,382	\$81,777
Miles of road operated close of year.....	156,404	192,556	240,831	259,941
Miles of road per 100,000 population.....	248.47	253.38	261.85	245.90
Miles of all main track operated.....	166,164	206,631	266,185	296,473
Miles of all main track per 100,000 population...	263.97	271.90	289.42	280.46
Total locomotives in service.....	30,140	37,663	58,947	67,242
Locomotives per 100 miles of road.....	19.3	19.6	24.5	25.9
Total tractive power of locomotives (pounds)...	Not available	Not available	1,588,894,480	2,381,514,675
Average tractive power of locomotives.....			27,282	36,005
Cars in freight service.....	978,231	1,365,531	2,135,121	2,373,727
Cars in freight service per 100 miles of road...	625	709	887	899
Total capacity of freight cars (tons).....	Not available	Not available	76,578,735	100,351,746
Average capacity of freight cars (tons).....			35.9	42.3
Cars in passenger service.....	26,820	34,713	47,095	55,994
Cars in passenger service per 100 miles of road...	17.1	18.0	19.6	21.5

¹From 35th Annual Report of Commission to Congress.

²Represents decrease.

³Includes 707 locomotives on which tractive power was not reported.

⁴Includes 364 electric and 751 steam locomotives on which tractive power was not reported.

⁵131,721 cars were leased in 1890 and not included in the number of freight or passenger cars shown.

⁶Includes 1,590 cars on which capacity was not shown.

⁷Includes 188 cars on which capacity was not shown.

What Railroads Are Doing With Electric Traction

The Effect of the Strike on Electrified Sections—New Projects and Equipment

By A. G. Oehler

Operation on 12 electrified sections of steam railroads during the recent shopmen's strike indicates that the effect of such a strike was not serious to these sections, for the reasons that in most cases new electrical men could be recruited and trained quickly, or in localities where the right kind of men were hard to get maintenance work could be deferred for a time, without hazard or injury to service, until an adequate force could be recruited.

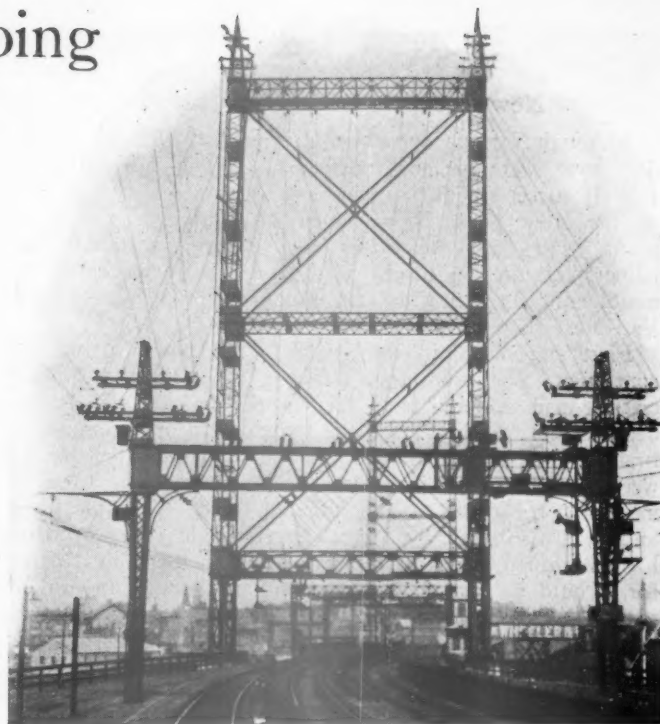
Foreign railroads have been much more active than American in adopting electric traction during the past year, but activity and interest in this country are increasing.

THE RECENT shopmen's strike shed much light on the effect of deferred maintenance on electric traction equipment and on the matter of keeping experienced operators and maintainers and breaking-in new men under strike conditions. Contrary to the predictions of the pessimists, operation was not hampered extensively by sabotage. In metropolitan districts the railroads had little difficulty in recruiting new electrical forces quickly. In one such case, operation of a power house was actually improved, as the new men did not have certain bad habits their predecessors had acquired. Practically every railroad which has an electrified section was able to maintain normal service on such sections. Although it was necessary to defer maintenance work, the shopping periods for electric rolling stock are so far apart that it was found possible to keep the equipment in operation until a sufficient maintenance force could be recruited. In some cases, the time between normal shopping periods was extended. Generally, the operation and maintenance of electric traction equipment is supposed to require specially trained men. The strike illustrated, however, that most of the jobs could be filled by the average outside electrical man after he had been given a small amount of instruction.

Briefly it appears that the several electrically operated districts proved themselves less vulnerable to the effects of the strike than were the great majority of roads under steam operation. The best illustration of this may be shown by a brief resumé of what happened on the various railroads.

Boston & Maine

The Boston & Maine lost every machinist, electrician, helper, foreman and clerk at the North Adams electric shop on July 1. Although the walkout was complete, a new force was organized quietly and so quickly that the Hoosac tunnel electric zone, which is the critical point of the road—"The neck of the bottle"—gave none of the anticipated trouble. In fact, service on the electrified section was in no way



Where the New Haven Crosses the Inlet at Bridgeport, Conn.

impaired by the strike. During the few days, from July 1 to about July 4, while experienced electrical workers were being recruited, there was no apparent failure of locomotives to meet the usual demands.

Although attempts were made to intimidate the line maintenance crew, it did not go out and the overhead system was not involved in any way. During the past year the overhead was entirely renewed, after being in service about ten years, and during November all brackets, messenger wire, etc., in the Hoosac tunnel, a distance of five miles, were painted.

The freedom from trouble on the Boston & Maine was probably due in some degree to local conditions. The district around North Adams, including other towns within six or eight miles and representing a population of about 45,000, is well policed and orderly. The railroad had the entire support of the town and city authorities and pronounced assistance from various industrial plants in the vicinity.

With reference to new men who come to work on an electrified section, it may be said that they are required to have more than ordinary education—not necessarily technical, but obtained either by study or actual experience. The new men who came to work for the Boston & Maine are still in the service, do their work expertly and take pride in keeping the apparatus in good repair.

All of the electrical power for the Boston & Maine is purchased from the New England Power Company, and for this reason there was no difficulty experienced in power house or substation operation.

An interesting incident of the strike has to do with the operation of the tunnel itself. The electric locomotives are used to haul trains, including the idle steam locomotive, through the tunnel, and special ventilation is therefore required. The two operators of the ventilating fan, at the central ventilating shaft located in the woods on top of the mountain, left work at 9:00 A. M., July 1. At 10:00 A. M., two experienced men were employed, and at 11:00 A. M. were at work.

The number of loaded cars moved eastward through the tunnel in 1921 during the months of July, August, September and October were 19,998, 20,798, 19,940 and 23,919,

respectively. The numbers for the corresponding months in 1922 were 16,567, 18,084, 19,792 and 24,757.

New York, New Haven & Hartford

Although various departments connected with the electrified zone were seriously affected, electric operation was entirely successful during the recent strike of the shop crafts on the New York, New Haven & Hartford. The power plant switchboard operators and electric repairmen and helpers left their positions as did practically the entire line maintenance organization and locomotive repair forces at the Van Nest shops and outlying points.

First consideration was given to the power plant, and continuous operation was attained by a few technically trained men gathered from various mechanical and electrical departments who undertook the switchboard operation for the first few days of the strike. It was possible after the first week to secure new operators and assistants who were immediately broken in as a permanent force. Valuable assistance was also given by a local electric light company which loaned trained electrical repairmen and helpers until a new force could be secured. At the end of the first month, the plant was operating satisfactorily with a new electrical organization. The steam end of the plant was not disturbed. At no time during the strike was there any delay on account of power plant operation in spite of the fact that the load was considerably increased.

The task of securing adequate line maintenance forces to take the place of those who struck presented some difficulty as the demand for linemen in the vicinity of the electrified section of the New Haven has been especially heavy. For this reason the labor turnover was high and it was difficult for the railroad to get really good men for this kind of work. The new organization has, however, been gradually built up until at present it is practically normal. In spite of difficult weather conditions, such as severe electrical storms and heavy rain during the first six weeks of the strike, the lines stood up remarkably well. Some of the maintenance and renewal work was necessarily deferred on account of the strike but this was not generally reflected in the operation, and maintenance is now normal.

In connection with the maintenance of the electric motive power, the management found it relatively easy to re-organize the greater part of the forces from applicants who applied for positions in large numbers. The supervisory forces from the beginning were able to take care of running repairs so that at no time was the shortage of electric motive power acute in spite of demands considerably above normal. After the first few weeks, a new shop force was organized, which after a necessarily large turnover has been shaken down into a satisfactory organization and repairs are now being handled under practically normal conditions.

All through the strike, and subsequently, the electric operation, as a unit, proved to be reliable and there were fewer delays to train service than on any other part of the system.

New York Central

Service on the electrified section of the New York Central was not impaired by the strike. It was not found necessary to defer any of the maintenance work on either the locomotives or the multiple unit cars, the same being true of the distribution and third-rail contact system. The railroad was able within a very short time to fill all vacancies.

The strike caused no interference on the Michigan Central Railroad, as none of the men handling either the power supply or locomotives went out on strike and it was possible to arrange in local shops for work ordinarily done in the steam locomotive shops.

Baltimore & Ohio

Electric operation on the Baltimore & Ohio was not af-

ected by strike conditions. Running maintenance of the locomotives was practically not interfered with as the electric locomotive foreman remained on the job and a furloughed man, who had formerly worked on the locomotives, was re-employed. With this as a nucleus, it was possible to break in a sufficient number of new men satisfactorily to take care of the minor running work. It was not necessary to shop any of the electric locomotives for extensive heavy repairs during the strike period.

The situation, with respect to the maintenance of the third-rail contact system, was similar to that of the electric locomotive in that the foreman remained on the job and worked with the few men that were employed, thereby creating a sufficient force to take care of routine repairs.

Electric power service is purchased from the local central station company. The railroad operates a rotary converter sub-station but the sub-station operators did not strike.

All of the locomotive maintenance and third-rail maintenance regular working forces were out for at least part of the strike, but it was possible to get new men almost immediately because of the few involved. A bonus was given to all B. & O. employees who remained loyal to the railroad.

Pennsylvania

According to a statement made recently by an official of the Pennsylvania, the strike was not effective in the electrified territory on the Pennsylvania. This may be substantiated and illustrated as follows: More than a week after the strike was declared on the electrified section of the Pennsylvania at Philadelphia, there was no evidence of the fact that a strike was in progress. Then railroad men, imported from other districts, succeeded in creating difficulties by intimidation of the men in service and during the second week of the strike a few men left work but in no case did they leave in large groups. The vacancies were filled rapidly by men from the supervisory force and other men who were attracted from other electrical work because of the favorable working conditions which the Pennsylvania offered to its men. In all, about 40 per cent of the men directly associated with the electrified districts left work. No difficulty was experienced with the substation operators and line repairmen as all of them remained at work.

There was no abnormal operation apparent to the public at any time during the strike. The regular 1,500-mile inspection of seven cars per day was carried on as usual. Some of the heavy overhaul work was retarded. No trains were delayed owing to the strike disturbance and at Broad street the usual suburban service was maintained. From 20,000 to 22,000 people use Broad street station each day.

The service on the West Jersey & Seashore was not impaired at all by the strike. Only one man from the Camden shop and one from the shop at Pavonia were lost. A total of 92 electrical men are employed on this line.

In connection with the electrified section of the Pennsylvania operating out of the Pennsylvania station in New York, the most serious difficulty was presented at the beginning of the strike by the loss of practically all of the employees of the Long Island City power house which furnishes power for the Long Island as well as the Pennsylvania. The supervisory force in the power house remained on duty. Men were immediately recruited from other parts of the railroad and from outside agencies and with the exception of a few hours when series running orders were necessary, normal service was maintained. In addition to the power house employees, certain substation operators left the service together with practically all of the car inspectors in the Pennsylvania station. The force at the Meadows shops where the electric locomotives are given heavy overhauling left work in a body and a part of the men at the Sunnyside inspection house also went out. The service was maintained in spite of these defections and new forces were recruited.

Long Island

On the Long Island practically the entire shop force and all of the car inspectors left the service. In the early days of the strike the equipment was maintained almost entirely by the supervisory forces while new men were being recruited. Armature winding and work on the motor fields was taken over by the Westinghouse Electric & Manufacturing Company and a certain amount of the mechanical work usually done in the shops was also "farmed out." The substation operating forces stayed with the railroad but the line maintenance men went out and were replaced with new men.

Probably the most notable feature in connection with the effect of the strike on the Long Island was the ease with which new men were obtained for electrical work. A new force was broken in with comparatively little difficulty which now gives the same results as were obtained with the old men. Considering the extreme congestion of traffic on the Long Island, the operation has been remarkable and much credit is given to the fact that the congested section is electrified.

Chicago, Milwaukee & St. Paul

On the Rocky Mountain and Missoula divisions of C., M. & St. P. all of the shopmen, substation operators, line repairmen, signal maintainers and car repairmen went out at 10 a. m. on July 1, leaving only a master mechanic, a general foreman and six foremen in the shops. There are ten electric passenger locomotives, 26 freight and three electric switching locomotives maintained in these shops. The substations were immediately taken in hand by track supervisors and men from the various offices who had been given preliminary instructions. A few delays were caused for a few days by one substation or another being off the line temporarily, but the service was maintained practically without interruption and there was no serious trouble. The substations are now fully manned with competent men, all of whom are new.

For a considerable period of time it was not possible to recruit a sufficient number of line repairmen but this work is now again on practically a normal basis. A considerable amount of trolley trouble was caused during the strike by lightning but the effect was probably not more serious than it would have been under normal conditions.

At no time during the strike was there any apparent danger of the service being crippled due to lack of available locomotives. This was in spite of the fact that it was not possible to obtain the number of maintenance men required and in spite of the fact that there was a large turnover among the new forces. It is common talk in the territory along the Rocky Mountain and Missoula divisions that the strike did not materially affect the operation of the electric power.

In the Seattle district practically 100 per cent of the shop employees went out on strike. This included also substation and power house operators. The strikers were immediately replaced by office workers and other men who had been previously trained by the operating department in the electrified territory during an abortive strike which occurred about a year previously. During the time when the shop forces were being built up, the railroad company adopted a policy of hauling complete trains into the shop where the Pullman cars were iced and watered and such minor adjustments made that were required on the locomotive.

Generally, it may be said that there was no interruption to service on either the east or west electrified section of the Chicago, Milwaukee & St. Paul.

Norfolk & Western

Service on the Norfolk & Western was not materially impaired at any time during the strike and as many loco-

tives were available for service as at any time previous to the strike. A slight restriction in operation was caused during the first few weeks owing to boiler room conditions in the power house.

It was not found necessary to defer maintenance work. Maintenance work on the electric locomotive is of course on a different basis than that on steam locomotives as the electric locomotives are at all times kept up to certain definite standards and do not have a general overhauling period as is the case with steam power. Tire changing on the electric locomotives was delayed for about 60 days and some of the locomotives ran for short periods with more lateral than they are permitted to have ordinarily. At the present time, the locomotives are in as good condition as they were before the strike.

Very little trouble was experienced from the overhead trolley system or from track bonding. One interruption was caused by lightning which flashed over some insulation on the high tension system. This would have happened under any circumstances but probably would have been corrected in somewhat less time had the usual maintenance force been available.

It was not possible to obtain many new men for electrical maintainers with special experience but it was found possible to train those who were obtained very quickly.

One hundred per cent of the mechanics went out. This included machinists, electric repairmen, pipe fitters, blacksmiths and helpers both on the locomotive maintenance and the power house repair work. The unskilled labor, which is colored, was not seriously affected. The power house operating force, the power directors and turbine operators did not strike. The generator attendants went out as did 90 per cent of the oilers, pumpers, etc. New men with some experience were obtained for water tending who rapidly broke in other new men as firemen. In the line department 70 per cent of the men struck, but by working on long shifts, the remaining 30 per cent were able to cover the maintenance work successfully until the force could be built up. The total forces on the electrified section were built up to practically full strength in 90 days from the commencement of the strike.

New Projects and Equipment

The most notable development in electric traction in the United States during the past year was the decision of the Illinois Central to adopt the 1,500-volt direct current system with overhead trolley for the electrification of the Chicago terminal district. Other activities in this country were confined largely to equipment orders.

The Pennsylvania has announced that it will electrify the heavy grade west of Altoona and that extensive improvements will be made at Altoona, Pa., including the construction of two extremely large repair shops. Announcement has also been made that the Pennsylvania will build three electric locomotives, the electrical equipment for which will be supplied by the Westinghouse Electric & Manufacturing Company. One of these locomotives will operate on 11,000-volt alternating current and the other two will be equipped to operate on 600-volt direct current. During the year the Pennsylvania also decided to purchase power from the Philadelphia Electric Company for the operation of the West Jersey & Seashore Electric Line which runs between Camden and Atlantic City.

The Pennsylvania Railroad Company will soon have in operation 15 new multiple unit cars on the Paoli electrification in Philadelphia, making a total of 130 cars in operation.

The Baltimore & Ohio ordered two 120-ton 600-volt direct current electric locomotives from the General Electric Company. These locomotives are to be delivered in March, 1923.

The New York, New Haven & Hartford ordered 12 180-ton 11,000-volt electric locomotives for passenger service

from the Westinghouse Electric & Manufacturing Company. These locomotives will also be equipped to operate on 600-volt direct current into the Grand Central Station, New York. The railroad has also secured eight motor cars and 14 trailers, utilizing series type alternating-current motors and storage battery control. A new 9,000-kw. turbine generator unit will be placed in the Cos Cob power station to take care of the additional load on the electric system.

The Norfolk & Western ordered through Gibbs & Hill, New York, from the American Locomotive Company, four 380-ton, 11,000-volt alternating current electric freight locomotives. The electrical equipment for these locomotives will be supplied by the Westinghouse Company.

The Long Island has announced that it will improve and extend its electric service. A 25,000-kw. generator has been installed in the Long Island City power plant and additional feeders have been run in conduit along the right-of-way to Forest Hills. The company has also started the work of extending the elevated structure through Hollis, Long Island, eastward through Queens to the Nassau County boundary line, a distance of about two miles. This extension will be elevated and four-tracked at the same time and the four-track section will be continued to Floral Park, two miles farther east. It is estimated that the work will require about a year and a half for completion at a cost of \$2,000,000.

Trackage rights on the Missouri, Kansas & Texas have been negotiated for by the Texas Power & Light Company and the Dallas Power & Light Company for the purpose of supplying electric passenger service between Dallas and Denton, Texas, a distance of 48 miles.

Complete data on heavy electric traction in North and South America was prepared this year by the Committee on Heavy Electric Traction of the Association of Railway Electrical Engineers. This data was presented at the annual convention of the Association held in Chicago from October 31 to November 3, inclusive. Similar data covering foreign electrified railroads was compiled by the Heavy Electric Traction Committee of the American Electric Railway Association and presented at the annual convention of that Association held in Chicago during October.

Electric Traction Development

Outside of the United States

The most extensive electrification initiated during the year outside of the United States was that of the South African Government Railways. Locomotives using 3,000-volt direct current will be used and the section electrified will extend from Glencoe to Pietermaritzburg, a total of 174 route miles. The total expenditure involved is placed at about \$20,000,000 and was divided up among a number of British firms; namely, the Metropolitan-Vickers Electrical Company, Ltd., T. A. Parsons & Co., Ltd., Babcock & Wilcox, Ltd., British Thomson-Houston Company, Ltd., Telegraph Manufacturing Company, A. Reyrolle & Co., Ltd., and the South African General Electric Company.

Of probably greatest importance to American manufacturers is the Mexican project. The International General Electric Company received an order from the Mexican Railway Company, Ltd. of Mexico City for the electrification of 30 miles of single track between Orizaba and Esperanza. Direct current (3,000 volts) will be used and the initial order for equipment included ten 150-ton locomotives, interchangeable for freight and passenger service.

In Canada the electrification of the Harbor Railway Terminals in Montreal, Quebec, is proceeding and it is expected that the total trackage of 58 miles will be entirely electrified some time during the next year.

Negotiations are in progress for the electrification of a section of the Central of Brazil.

According to commerce reports, 1,500,000 gold pesos is to be provided by a proposed law for the electrification of

the Argentine Transandine Railway between Zanjón in the Argentine and the Chilean frontier. The length of the line is about 28 miles.

Work on the electrification of the Chilean State Railways between Valparaíso and Santiago was begun on April 12 and material for this work is being shipped from time to time by the Westinghouse Electric & Manufacturing Company and the Baldwin Locomotive Company.

In England plans and negotiations are being made for the purpose of obtaining a supply of electric power for the electrification of the South Eastern & Chatham. A new type of electric locomotive for high speed passenger service, which has a symmetrical wheel arrangement and unusually large driving wheels, is being tried out on the North Eastern Railways. The London, Brighton & South Coast Railway, England, has deposited a bill in Parliament to raise additional money for the purpose of electrifying certain portions of its line. It is estimated that the work will require an expenditure of between four and five million dollars. The Metropolitan Railway in England has rebuilt 20 locomotives for high speed passenger service.

A concession was granted to A. S. Akersbanerne in Norway for the construction of an electric railway to extend from Christiania to Ostensjø, a distance of about five miles. Two additions have been made to the Riksgränsen Line in Scandinavia during the past year. These additions extended the line from Nattavara to Luleå, a distance of about 100 miles, and from Riksgränsen to Narvik in Norway, a distance of about 25 miles.

The Dutch Government has appointed a commission for the purpose of studying a general electrification plan for Holland which includes the electrification of the Dutch Railway.

Work has been started in France to electrify the 145 miles of the Paris-Orléans Railway from Paris to Vierzon. The 1,500-volt direct current system will be used. Contracts amounting to \$8,000,000 have been let and equipment is being supplied by French, English, Swedish and American companies.

Switzerland has been particularly active in the development of its electrification program. The work of electrifying the St. Gotthard Railroad was finished and the second bore of the Simplon tunnel was completed. This tunnel is over 12 miles in length. A number of new locomotives has been placed in service on the Swiss Federal Railways including three or four new types.

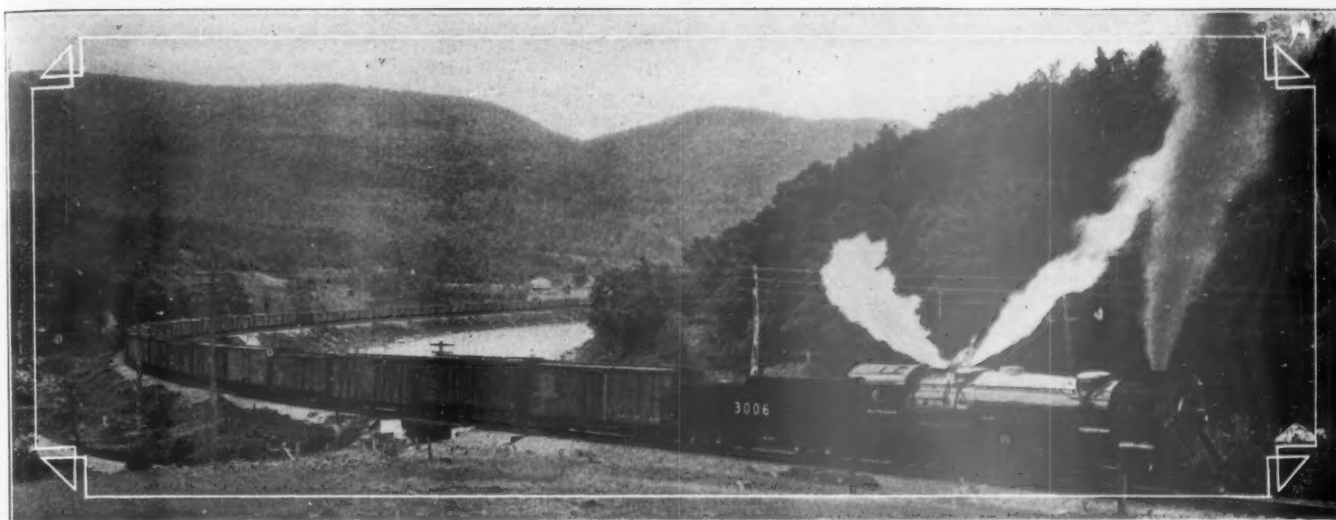
A contract was let to the General Electric Company in 1921 for the electrification of 40 miles of the Spanish Northern Railway. Completion of this work is in progress and during the year six 3,000-volt direct current locomotives were ordered from the Westinghouse Company.

In Italy, the work of electrifying the Bologna-Florence, Faenza-Bologna, Genoa-Pisa, Rome-Tivoli, and Rome-Anzio-Nettuno Lines is in progress.

The Hungarian government is making efforts to electrify the State railways through the agency of a special government commission.

A large railway electrification program is being placed in effect in Japan; 600-volt and 1,200-volt direct current will be used. During the year the English Electric Company received an order for 34 complete electric locomotives of a total value of over \$2,000,000. Two locomotives were also ordered from the General Electric Company in this country, two from the Westinghouse Electric & Manufacturing Company, two from the English Electric Company (England), and two from Brown, Boveri & Co. of Switzerland. The Westinghouse Company also supplied motor car and sub-station equipment.

Estimates made in the Netherlands Indian budget for the electrification of the railways of Java have been accepted but no time has been set for the beginning of the work.



Santa Fe Locomotive with 79 Cars on Boston & Maine

Valuation Work Makes Progress During 1921

Large Number of Tentative Reports Issued— Problem Approaches Final Stages

By E. T. Howson

THE YEAR which has just closed has been characterized, from the standpoint of the federal valuation work, by the concentration of effort on the preparation of tentative reports on the properties of the larger carriers. While this has reduced to some extent the number of tentative reports which have been completed, more than 100 tentative valuations have been served during the year, including those on the properties of several large roads. The Commission has also issued its first reports fixing the "final value" of a number of properties. A measure which tends to counteract the delay in the work due to the concentration on the larger roads has been the repeal by Congress of that section of the Valuation Act requiring the Commission to report the "excess cost" of common carrier land, thereby relieving it of a large amount of work.

The past year has seen the completion of the transition of the work of the Bureau of Valuations from the field to the office. The field work in the engineering department was completed early in 1921, and in the land and accounting departments late in the year. Shortly before the end of 1921 arrangements were made to close the five district offices and on January 1, 1922, the last of this work was concentrated at the headquarters at Washington. The drastic reduction in forces made at the time the outlying offices were closed resulted in considerable demoralization of the work during the early months of the year, but this has now been overcome in large measure. While the concentration of all work at the headquarters has made possible the adoption of more uniform practices than prevailed when the work was divided between five widely separated offices, and to this extent has thereby simplified the negotiations between the carriers and the Commission, it has made communication more difficult and has made it necessary to handle many matters by correspondence which were formerly handled directly or by telephone. With the reorganization of this work, the carriers have also experienced increased difficulty in harmonizing differences, due apparently to a change in the policy

of the Bureau of Valuation or the restriction of authority of those now in direct charge, which condition has tended to retard the work.

From the standpoint of the Commission, one of the most important developments of the year was the repeal of the requirement in the Valuation Act of 1913 to report the "excess cost of condemnation and damages or of purchase in excess of present value" of land, thus nullifying the decision of the United States Supreme Court of March 8, 1920. In its early work the Commission had ignored the provision in the Valuation Act requiring it to report this "excess cost" of land on the ground that this information was not of use as an element of value. The Kansas City Southern brought an action of mandamus to force the Commission to comply with this provision of the Act, and the court held that the Commis-

Section	Number of reports	Number of corpora- tions	Miles of road*	Per cent of total mileage
Accounting, as of December 10, 1922...	576	989	153,975	62.09
Accounting, as of December 31, 1922†...	585	1,039	176,475	71.16
Engineering, as of December 10, 1922...	657	1,199	183,259	73.93
Engineering, as of December 31, 1922†...	670	1,217	194,098	78.27
Land, as of December 10, 1922.....	687	1,085	146,717	59.16
Land, as of December 31, 1922†.....	714	1,119	168,328	67.87

*Miles of first main and branch line roadway; no duplication for second track.
†Estimated.

sion was required to find this cost irrespective of its value. The Commission then withdrew the 55 tentative valuations which had been issued and held up others until the information could be secured to enable it to comply with the decision. At the same time it supported an amendment to the Act which would eliminate this requirement, which amendment was passed by Congress and was signed by the President on June 7. While the roads contend that the ignoring of this element of cost is a denial to them of a portion of their investment, the elimination of this requirement has greatly simpli-

fied the work of the valuation forces and has expedited the completion of the work of the land division.

Progress During the Year

The work of the Division of Valuation is divided into three major groups: engineering, land, and accounting. The preparation of the underlying reports of all of these divisions is rapidly nearing completion. The status of the work of these branches is shown in the table.

Of those reports completed on December 10, 1922, approximately 236 engineering, 311 land and 284 accounting reports had been finished in the preceding 12 months.

Similar progress has been made in assembling these reports into tentative valuations and serving them on the roads. Prior to December 9, 1921, 177 such reports had been issued on 220 properties, whereas the status of these tentative valuation reports is now as follows:

Date	Number of reports	Number of corporations	Miles of road	Per cent of total mileage
December 10, 1922.....	306	429	43,701	17.62
December 31, 1922 (estimated)...	316	455	46,934	18.92

In noting these figures consideration should be given to the fact that, following the reorganization of the forces, efforts have been concentrated in large measure on the production of reports covering the major steam railway properties, particularly those of the carriers whose gross revenues exceed \$25,000,000 or more per annum, and material progress has been made on these reports. Moreover, 55 tentative valuation reports, embracing 75 corporate properties with 20,635 miles of road, were completed on December 16 but had not been issued or included in the figures given above. Included among the larger roads on which tentative valuation reports have been made during the past year are the Chicago & Eastern Illinois; the Cleveland, Cincinnati, Chicago & St. Louis; the New York, New Haven & Hartford; the Toledo, St. Louis & Western, and the Virginian.

Of the 287 tentative valuations which had been served prior to October 31, 101 had become final through absence of protest. Full hearings upon protests have been had in 39 cases, 6 cases have been partly heard and 33 were assigned for hearings before the close of the year. Final arguments have been made in 15 cases, while the issues raised by protestants in 19 cases were submitted without argument.

Support for the Work

As the year has drawn to a close there has been an increase in the pressure for the completion of the work on the part of the Commission and the railways and a continuation of the reversal in position of those who originally advocated the Valuation Act. In its annual report submitted to Congress last month, the Commission stated that the emphasis laid upon valuation by the Transportation Act, 1920 has necessitated that the work be expedited for certain provisions of that Act cannot be carried out effectively without the information supplied by it. Among other provisions the grouping of the properties into a limited number of systems is dependent upon data procured from the valuation, as is the action of the government in recapturing excess earnings.

On the other hand, the work has lost the support of those members of Congress who saw in the valuation a means of further harassing the railways and who, for this reason, supported the Act and were primarily responsible for its passage. As the tentative valuations have appeared and it has become evident that this work will not substantiate their claims of over-capitalization of the properties as a whole, these men have withdrawn their support and in some cases are now open opponents of the work.

As the work of inventorying the properties and placing unit prices on them is drawing to a close and is approaching the point where the Commission must fix the final values on the larger properties, the important principles of valuation are

coming to the front. While 101 valuations became final prior to October 31, through absence of protest, none of these were properties of any magnitude, nor did they establish any important principles. While the Commission has heard the protests on a considerable number of properties, it has issued no decisions as yet and although it has given no intimation of its plans, it is believed in some quarters that it will not rule on these points until all of the tentative reports have been completed. Whether this is done or not, it is evident that the Commission must now prepare to give more attention to the important problems which are presented. It has been evident from recent hearings that the members of the Commission have not been fully informed regarding the progress of the work up to the present time, but the decisions which must soon be made on basic questions of principle are so important that they cannot be delegated to subordinate departments but must be those of the Commission itself.

At the same time it is evident that the railways and particularly their executives and legal advisors must also give more consideration to the problems presented because of the close connection which the valuation will bear to railway regulation in the future. The appearance of the carriers before the Commission on November 1-3 showed clearly the lack of agreement between the roads on basic principles. It would seem fundamental that the carriers must first agree among themselves regarding their attitude on these basic questions and harmonize their activities through the medium of the President's Conference Committee or some similar body if confusion is to be avoided and decisive action by the Commission itself hastened.

As additional tentative valuations are being issued, the interest in the relation which these valuations bear to the capitalization of the properties which they cover is increasing. A sufficient number of reports have been issued to make it possible to estimate the relation which the total valuation of all of the roads will bear to the total capitalization. On the basis of the relation which the mileage of the roads on which tentative reports have been issued bears to the total mileage of the country, the "final value" will approximate 75 per cent of the net capitalization. However, those lines on which reports have been issued are principally small roads of less than the average development and if this fact is taken into consideration the indications are that the valuations when completed will support the net capitalization of the roads as of the date of valuation.

While the Commission has fixed the final value of many small properties, it has in no case as yet outlined the manner in which these values have been arrived at. This has been a point of contention with the carriers, who have maintained that they cannot prepare their protests intelligently.

The inventory has now been completed. The preparation of the tentative valuations is proceeding rapidly and should be completed in large part in 1923. While it is difficult to estimate the progress of any work of this character, the Commission indicated in its annual report that it expected that underlying reports would be available early in 1923 covering approximately 75 per cent of the total railway mileage. It has been estimated further that the tentative reports will be completed for all of the large properties prior to June 30, 1924. Progress is, however, dependent on the liberality of the appropriations made by Congress for this work. This year the Commission has asked for \$1,280,000 for the fiscal year ending June 30, 1924, whereas the recommendation submitted to Congress by the President the first week in December as the decision of the Budget Bureau allowed only \$1,000,000 for the valuation work. It is understood that the Commission will make a strong effort to get this figure increased in the actual appropriation bill by showing the importance of the work before the Senate and House Committees and particularly because of the demand for valuation figures for the purpose of figuring excess earnings.

Freight Claim Adjustments Decreased



Condition of Shipment of Cotton Goods from Japan, on receipt at Vancouver, B. C.

By R. A. Doster

Freight claims decreased 51.6 per cent in 1922 as compared with 1921.

Sixty-seven per cent of claims presented in 1922 settled within 30 days, as compared with 58 per cent in 1921.

Rough handling of cars caused 16.8 per cent of claims paid.

Attention to loading, transferring and delivery of freight and handling of way bills on one road reduced claims from \$50,000 a month in 1921 to \$4,000 in September, 1922.

Substantial packing reduces loss from damage and pilfering.

ONE of the most successful campaigns which the railways have ever launched has been that designed to reduce the number of loss and damage claims. While this campaign was inaugurated in 1920, it has made marked progress during the year which has just closed. The large and rapidly increasing number of freight claims prior to 1920 was a growing menace to carriers and shippers alike. The co-operation of the shippers and the carriers in the national campaign of the Freight Claim Division of the American Railway Association, which has now been in progress for two years, has shown remarkable results as the following claim figures for recent years (for freight loss and damage only) as reported to the Interstate Commerce Commission show:

1917	\$35,079,000
1918	55,738,000
1919	104,587,000
1920	119,833,000
1921	92,500,000
1922	50,000,000 (estimated)

The number of freight loss and damage claims presented to the steam railways of this country has decreased steadily since 1919. During 1920, 4,800,024 claims were presented. This number decreased to about 3,384,000 during 1921. During the first nine months of 1922, the number of claims

Shippers and Carriers Co-operate in the Campaign of the A. R. A. to Reduce Payments



Condition of Shipment of Cotton Goods from United States on Receipt at Vancouver, B. C.

presented declined to 1,649,790, as compared with 1,956,669 filed during the first nine months of 1921. Claims carried over as unsettled with claims at the end of 1920 totaled 653,312, and this figure was decreased 58 per cent or to 274,528 at the close of 1921. On January 1, 1921, there were 578,525 unadjusted claims, which number was reduced to 286,410 at the close of the third quarter of 1921. The number of open claims at the close of the third quarter of 1922 was 230,350, which was 18.7 per cent less than the number at the close of the third quarter of 1921. In the first nine months of 1921, claims paid totaled \$77,876,814, while in the first nine months of 1922, claims paid totaled \$37,686,169, a decrease of 51.6 per cent.

67.5 Per Cent Settled in 30 Days

During 1921, 58 per cent of all claims were settled within 30 days from the date of presentation and 78 per cent within 90 days. In contrast, a report for September, 1922, shows that 67.5 per cent of all claims were settled in 30 days, 19.4 per cent in from 30 to 90 days, and only 13.1 per cent required longer than 90 days.

Investigation

The ability to settle all claims within 30 to 90 days is dependent upon the manner of presentation of the claim. In many cases it is first necessary to obtain facts concerning the case which were not furnished by the claimant. In other instances, the investigation is delayed to permit the claimant to submit additional evidence which he should have filed with the claim in the first place. When refrigerator or ventilated cars are involved, settlement is prolonged by the fact that it may be necessary to secure records from various points at which these cars were re-iced or ventilated before it can be determined whether the damage alleged resulted from irregular service. Many claims require a great deal of investigation before the liability is proved to be on a legal basis. This is especially true of interline shipments where the cause of the damage is obscure.

The reduction of claims during the campaign has been

especially pronounced in the case of those for the value of merchandise lost. The reduction in this class of losses may be represented by a road whose claims amounted to approximately \$50,000 a month in the first part of 1921, and which, by careful attention to the loading, transferring and delivery of freight and the handling of way bills has been gradually decreased to an amount slightly over \$4,000 for September, 1922.

Claims for Shortage

The committee on Freight Claim Prevention, after a careful study of the situation, has endeavored to correct conditions and has drafted a plan for safeguarding the handling of freight which becomes separated from its way bills. The adoption of this plan by many railroads has resulted in a decline in claims for shortage. In September, 1922, the claims paid for shortages amounted to only \$293,948, which was 8.7 per cent of the grand total, while in January, 1921, the amount was \$1,635,350, the largest ever paid, when it formed 15.8 per cent of all claims paid.

First Nine Months of 1922

Figures for the first nine months of 1922 show the payments of claims aggregating \$37,686,169 divided as follows:

Loss in car package.....	\$4,520,489 or 10.8 per cent
Loss other than in car package.....	2,670,087 or 7.1 per cent
Damage	5,430,223 or 14.4 per cent
Rough handling of cars.....	6,314,412 or 16.8 per cent
Improper car handling, loading, unloading or stowing	802,498 or 2.1 per cent
Defective or unfit equipment.....	3,772,481 or 10.0 per cent
Improper refrigeration or ventilation.....	1,163,518 or 3.1 per cent
Freezing or heater failure.....	670,425 or 1.8 per cent
Delay	4,077,988 or 10.8 per cent

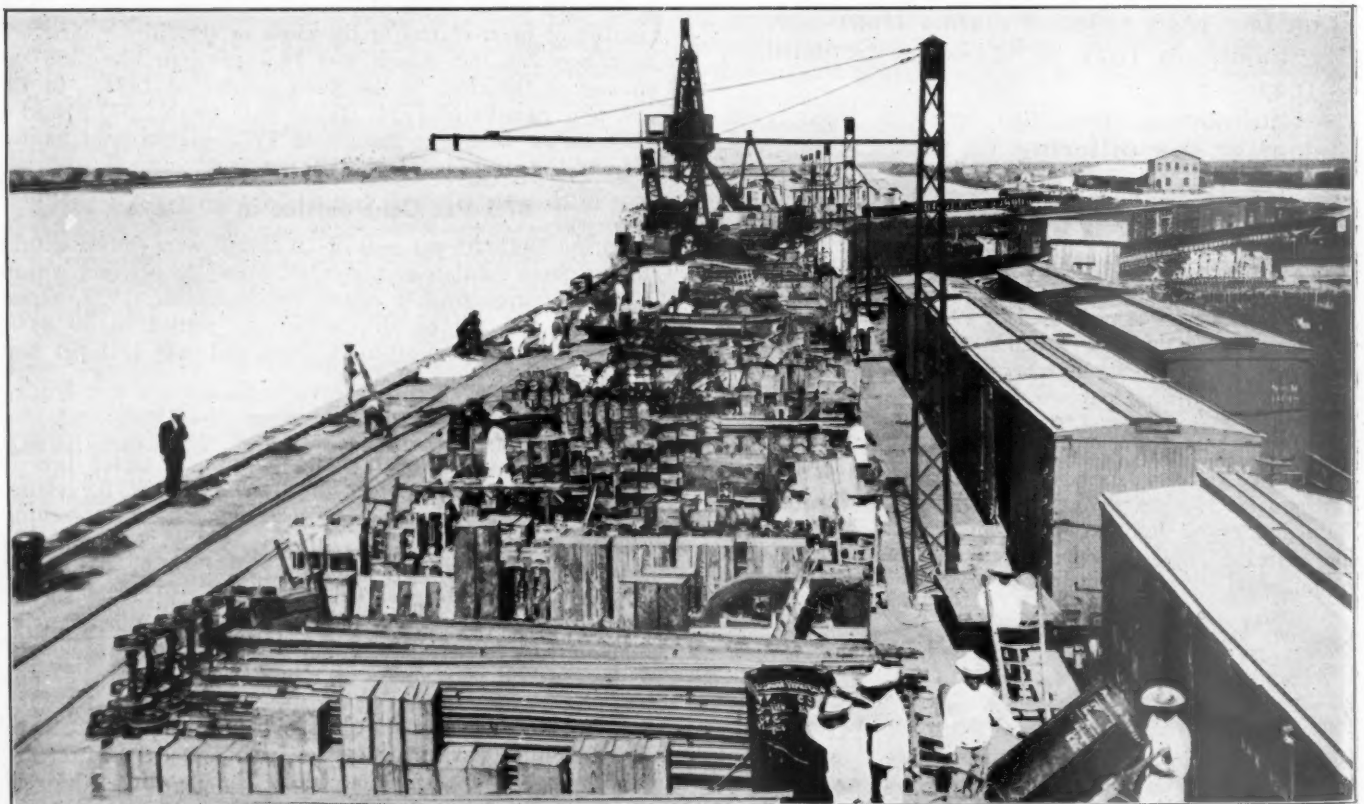
Robbery in car package.....	1,911,032 or 5.1 per cent
Robbery other than in car package.....	1,998,248 or 5.3 per cent
Concealed loss	462,743 or 1.2 per cent
Concealed damage	1,162,875 or 3.1 per cent
Wrecks	1,895,861 or 0.5 per cent
Fire or marine loss or damage.....	366,373 or 0.7 per cent
Error of employees.....	1,034,916 or 2.7 per cent

The greater part of the responsibility for the amount paid for loss and damage claims may be attributed to the carriers, and is the result of careless billing, rough package handling, rough car handling, defective equipment, defective ventilation and delay in transit. On one of the larger roads claims paid due to rough handling amounted to 12.2 per cent of all claims paid during 1921, and during the first four months of 1922 the payment represented 12.8 per cent. This company is now paying more attention to the cause of these claims and has put in service a number of impact registers which serve to record the exact time and the force of the shock sustained in each of the cases of rough handling.

More Adequate Strapping

Among the practices advocated to reduce claims resulting from inadequate packing, is more substantial strapping, which not only adds to the strength of the container and insures the perfect condition of the merchandise upon arrival, but eliminates a large part of the annual loss from pilferage. Shippers are realizing more and more the necessity of scientific packing.

One concern which pays particular attention to strapping, reports that since adopting this system, package trouble caused by damage and pilfering has decreased 42 per cent during a period in which the shipments increased 20 per cent.



P. & A. Photo

A Modernized Railway Dock at Tampico, Mexico

Foreign Railways Section

British Railways Show Progress During 1922. By W. H. Fraser.

French Railways Still Operate at Deficit. By M. Peschaud.

Italy Plans Return to Private Ownership. By Antonio Giordano.

Polish Railways Make Great Strides in 1922. By Col. A. B. Barber.

Russian Railways Aid Famine Relief Work. By Captain Geoffrey L. Carden.

Some Improvement in Central Europe's Railways. By A. Niklitchek.

First Steps in Unification of German Railroads. By Dr. J. Stumpf.

Conditions Improve on Other European Roads. By James G. Lyne.

Railway Mileage in Mexico Still Inadequate. By W. D. Hornaday.

Canadian Roads Improve With Lower Gross. By J. L. Payne.

Argentina Looks to New Year with Hope. By M. Michelin.

Australia Turning to American Practice. By W. H. Newman.

Extensive Development Planned in South Africa. By Gilbert E. Chittenden.

Many Railway Developments in India in 1922. From a Correspondent in India.

Recent Developments on Japanese Railways.

The Chinese Railways Had a Bad Year in 1922. By Railway Age's Correspondent in China.

The Contributors to the Foreign Section

Writers from Principal Countries the World Over Review Railway Developments in 1922

ON THE following pages the *Railway Age* presents for the second time in its Annual Review Number a series of articles covering developments during the past year on the railways of the principal foreign countries.

We feel that with these articles this issue of the Annual Review Number comes nearer to presenting a concise, up-to-the-minute picture of recent railway developments and the railway situation as it is today not only in this country, but throughout the world, than anything previously published. No claim to perfection can be made, of course. Contributions had to be sought from the four corners of the earth. To some of these places mail service is so slow that when contributors were unable at the last moment to undertake our assignments there did not remain sufficient time to arrange for articles from other writers and it was necessary for our staff to secure such information as could be obtained in this country. In one case, our South American correspondent mailed to us an article on the railway situation in Argentina, which was duly received. In the next mail he sent articles dealing with Brazil, Chile, Bolivia and other important South American countries and photographs to illustrate all his articles. At the time of going to press this material had not arrived.

Not only are our contributors scattered the world over but many of them write only in foreign languages, which made necessary the translation of their contributions. Insofar as was feasible our correspondents were selected from among those who, while intimately acquainted with conditions in their own countries, were also able to appreciate the point of view of those familiar with railroad conditions only on this continent. They were requested to deal with developments according to their relative importance, i. e., to review concisely events of minor importance and to go into detail concerning happenings of considerable moment. This will explain the fact that some of the articles are devoted in large part to some one phase of the railway situation, such as mechanical matters, labor and finance, national politics, etc.

Among our contributors are two Americans who have recently spent some time in Europe and are well qualified to describe conditions in the countries of which they write. These men are *Col. A. B. Barber*, who has written the article entitled "Polish Railways Make Great Strides in 1922," and *Capt. Geoffrey L. Carden*, who tells how the Russian railways were made to aid in the relief of the famine. *Col. Barber*, formerly of the army engineers, served until recently as technical adviser to the Polish government, having been nominated for that position by Mr. Hoover in 1919 at the request of the Polish government for an American engineer to assist in the organization of transportation, coal and other basic industries. He has been closely connected with all the progress Poland has made in these fields and no one is better qualified than he to discuss them from an American point of view. *Capt. Carden* has recently returned from Russia where he was actively engaged with the American Relief Administration in breaking the Russian famine.

J. L. Payne, who has written the article entitled "Canadian Roads Improve with Lower Gross," needs no introduction to readers of the *Railway Age*. He was formerly comptroller of statistics for the Department of Railways and Canals of the Dominion of Canada and has for many years been a keen student of Canadian railway affairs. He has been a welcome contributor to the columns of the *Railway Age* for a number of years and, in view of the interesting develop-

ments which have taken place in Canada during the past year, we feel that his article in this issue will be read with even more than usual interest.

M. Peschaud, secretary of the Paris-Orleans Railway Company, is the author of the article reviewing conditions on the French railways. Like Mr. Payne, his name has appeared a number of times before in the *Railway Age*. Likewise, he too is a well-known student of railway affairs in his own country. His report of progress is interesting, particularly because it tells of the operation of the railways for a year under the drastic reorganization which was brought about by the French Railways Act of 1921.

Professor J. Stumpf, privy councillor and professor in the Charlottenburg (Berlin) Technische Hochschule, has written the article entitled "First Steps in Unification of German Railroads." Professor Stumpf is a well-known mechanical engineer and is the designer of the Stumpf Una-Flow engine.

A. Niklitchek, who tells of "Some Improvement in Central Europe's Railways," is a railway mechanical engineer employed as an engineer of tests in the locomotive works of the Austrian State Railways. He is also a lecturer on railway subjects in the state educational institutions.

C. H. Newman, publicity officer of the New South Wales Government Railways, has written a concise, clear and up-to-date article on the railway situation in Australia. His contribution will, we feel, be particularly interesting in that he tells of the interest in American methods and the tendency to bigger cars and locomotives.

Gilbert E. Chittenden, who has contributed the article entitled "Extensive Development Planned in South Africa," is attached to the staff of the general manager of the South African Railways. He tells a most interesting story of the development of South Africa's railway system and the great plans for the future. This article and the one on Australia should be of particular interest to our Canadian readers, not only because they deal with other British dominions, but also because both of these countries have problems, similar to Canada's, of a considerable state-owned railway mileage, built primarily to develop the country and which the governments concerned are trying to operate profitably.

W. H. Fraser, who tells the progress of the British railways in dealing with the labor problem and in consolidating their properties into a few large systems, is a member of the staff of the superintendent of the line of the Great Western Railway of England.

Antonio Giordano, who tells of the plans of the Fascisti government for a return to private operation for the Italian railways, is the *Railway Age's* regular correspondent in Italy. Similarly *M. Michelin*, who writes from Buenos Aires about the brighter prospects of the Argentine railways, is a regular contributor to our news columns. *W. D. Hornaday*, the *Railway Age's* correspondent in Texas, has written the article describing Mexico's railway facilities. Mr. Hornaday is well acquainted with Mexico, having at one time been publicity agent for the National Railways.

Our correspondents in India and China must unfortunately remain anonymous. Their contributions, however, are among the most interesting of all. Both of them are thoroughly familiar with American railroading and both are in the closest touch with the railways of their respective countries. The result is that they have been able to make their articles particularly informative to the American reader. Our correspondent in India pointedly criticizes American practice.



The Cornish Riviera Express, Which Makes the Longest Non-Stop Run in the World, 226 Miles, from London to Plymouth

British Railways Show Progress During 1922*

Consolidation Completed, Rates Reduced and Financial Status Improved—Labor Relations Happy

By W. H. Fraser

LONDON

IF PROOF were required to demonstrate the disadvantages of government as compared with private operation, it is to be found in the remarkable progress made by British railways in 1922. The railways were returned to their owners in August, 1921. The year 1921 ended with a deficit of \$43,000,000, and but for the compensation agreements with the government for the use of the railways, the companies would have been unable to meet their obligations to the debenture and other stockholders. The year 1922 opened with many of the gravest financial problems still unsolved. The shortage of money through trade depression, heavy taxation and unemployment destroyed all hopes of substantial increases in revenue. Traffic receipts were dwindling, expenditures were abnormally high, whilst the companies had also to meet a persistent and growing demand from the public for a reduction in rates and fares, the financial embarrassment of the railways being either misunderstood or ignored.

These exceptional conditions were further complicated by the statutory obligation of the railways under the Railways Act of 1921 to consolidate their 120 railway systems into four large groups by the end of 1922. With railways in the melting pot, buyers fighting shy of railway stocks, development retarded and the necessity for stabilizing financial security and restoring public confidence, the managerial staffs were put to the severest tests in British railway history. That they have succeeded in overcoming the initial but greatest difficulties is beyond doubt, and the year has ended with the sure and certain knowledge that the railway systems of Great Britain have again been placed on a thoroughly sound and businesslike basis.

Railways Consolidated into Four Large Systems

Sir Frederick Banbury, the chairman of the Railway Companies' Association, told the House of Commons that the business of amalgamating Great Britain's railways into four

groups was such an intricate problem that it almost passed the wit of man to know how it could be solved. At one time it was thought that in some of the groups the financial adjustments of railway stocks presented such insuperable difficulties that the preparation of voluntary schemes was impossible. Happily, agreements have been reached between all the largest companies with two exceptions, though in some cases the terms of fusion still remain to be approved by the shareholders, or require the sanction of the Amalgamation Tribunal appointed under the Railways Act.

The greatest progress has been made in the Western group, where six Welsh railways and a number of smaller companies have been amalgamated with the Great Western Railway. For all practical purposes this group has been completed and operated as one railway for some months. With the Welsh railways go the railway-owned docks in South Wales, and as the Swansea Harbour Trust is shortly to be merged into the Great Western Railway, that company now owns the whole of the chain of docks on the South Wales seaboard, stretching from the River Severn to the Irish sea. The Great Western Railway has the distinctive privilege of being allowed by a special clause in the Railways Act to retain its present title.

The Lancashire & Yorkshire Railway, which ranked as the fourth largest railway system in Great Britain, has been merged into the London & North Western and the two have been operated as one undertaking for the past 12 months. The Midland and some Scottish companies in the North Western group have also come to terms and the name of the London, Midland & Scottish Railway has been agreed upon. In the Eastern group the North Eastern Railway has taken over the Hull & Barnsley Railway & Docks. The North Eastern company has come to terms with the Great Northern, Great Eastern, Great Central, North British and Great North of Scotland and the amalgamation scheme has been approved by all the stockholders. This group will eventually become the owners of extensive docks and ports

*EDITOR'S NOTE—Our correspondent's figures of pounds, shillings and pence have been converted to American money at \$5 to the pound, 25 cents to the shilling and 2 cents to the penny.

on the east coast and in Scotland. The new name of the group has been announced as the London & North Eastern Railway. Amalgamation schemes in the Southern group have been sanctioned by the shareholders, and all the groups are expected to be completed, with the exception of a number of unimportant subsidiary companies, by January 1, 1923. This system will be known as the Southern Railway.

Reasons for Consolidation

The grouping of railways is looked upon with misgivings by the spokesmen of many railway companies, though it has not prevented them from loyally carrying out the wishes of Parliament. In labor circles railway grouping has been received with unqualified satisfaction, as being a helpful step forward towards nationalization. That gratification is not shared by the British public generally who have come to regard government control of anything as *anathema maranatha*.

It may be again recorded that the object in grouping is to secure economies in operation, a large percentage of the resultant savings being handed over to the public in the shape of reduced rates and fares. That economies will be effected through amalgamation is beyond dispute, but there is a considerable difference of opinion as to the amount of the estimated savings. Sir Eric Geddes, who was sponsor for the Railways Act, put it as high as \$100,000,000 per annum, roughly eight per cent of the total expenditure, though he admitted it would take a considerable number of years to reach that figure. Prominent railway men estimate the ultimate savings at \$25,000,000 a year. If the system of private ownership of freight cars (of which there are 700,000, or 50 per cent of the total number in the country) could be abolished, another \$10,000,000 a year would be saved, and together with other economies a figure of \$50,000,000 a year might be reached in time. The principal direction in which economies lie is in standardization of equipment and rolling stock, centralized purchase of stores and the elimination of duplicated staff in competitive areas.

It is remarkable that neither the public nor the general press have yet realized the vast changes that are being made in British railways; changes which will transform British railway practice and affect every single citizen directly or indirectly by possible alterations in rates and charges. New schedules of rates have to be submitted to the Railway Rates Tribunal, but the hearing of the companies' case and the traders' objections is expected to last a lengthy period. Reliable authorities assert that it will take five years before the Tribunal can fix the "appointed day" for bringing into operation the new schedules.

Labor Situation Extremely Favorable

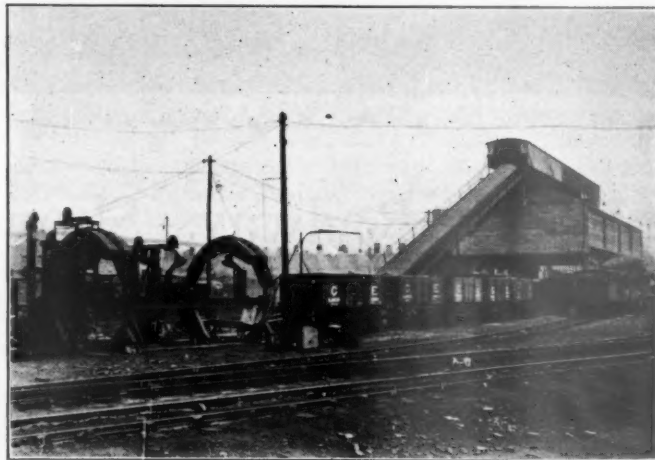
The record of 1922 as to the relations of the railway companies and their employees has been marked by a consistently friendly spirit on both sides. The voluntary agreement of May, 1921, between the railway companies and the trade unions for the settlement of disputes has undoubtedly created peace in the railway world and helped the companies in their progress towards reconstruction. The railway employees are entrenched behind an act of Parliament which provides that, with the exception of automatic adjustments of pay following a fall in the cost of living, no alteration can be made in rates of pay or conditions of service, except by negotiation with the trade unions or, in default of an agreement, by the decision of one of the wage boards. This arrangement cannot be terminated before January, 1924.

A severe test of the new machinery was made in January, 1922, before the National Wages Board when the Scottish railway companies succeeded in obtaining financial relief by the concession of a spread-over of the eight-hour day for certain positions in country districts, and by the removal of the "prosperity bonus" of 1920, approximately five shillings (approximately \$1.25) per week per man. The award was

subsequently applied to railways south of the Scottish border.

Another interesting case, which came before the Industrial Court, was that of railway shopmen. During the war as wages increased in the engineering industries, railway shopmen claimed and received corresponding advances. When a portion of the war bonus was removed from the wages of shopmen other than railwaymen, the National Union of Railwaymen astutely brought forward the claim that the railway shopmen were in a class by themselves and should be treated as a separate industry. The claim was upheld by the Industrial Court and the drop in shopmen's wages was not so great as in the case of similar grades of men employed outside railway shops.

Railway employees have loyally observed the sliding scale arrangement, which provides that for a rise or fall of five



A Mechanical Coaling Plant at Stratford on the Great Eastern

points in the index number of the cost of living there should be an increase or decrease of one shilling (approximately 25 cents) per week in wages. During the year under review no increase has been recorded, whilst the fall in the cost of living to 80 points above pre-war figures has involved reductions for numerous classes of employees of eight shillings (approximately \$2) per week and the removal of the "prosperity bonus" of 1920. A number of grades have now reached the standard rates which are generally 100 per cent over the pre-war figures. Typical examples of rates are shown in Table I.

TABLE I

	Weekly wages		
	December 31, 1921	November, 1922	Standard rates
Enginemmen	\$20.00	\$18.00	\$18.00
Firemen	15.50	14.25	14.25
Train ticket collectors.....	17.50	15.00	15.00
Porters (grade 1).....	15.87	12.87	11.50
Shunters (grade 1).....	18.62	16.25	16.25
Guards (grade 1).....	18.62	16.25	16.25

Negotiations are now proceeding with the trade unions for the variation of what are known in the railway service as "side shows" (i.e., various arbitrary working conditions).

The object of the discussions is to endeavor with the help of the unions to find some means of easing the huge burden of expenditure without inflicting hardship on the men. Some of the proposals before the negotiating committee are a modification of the existing arrangements in connection with the guaranteed week and the guaranteed day and the method of payment for Sunday duty and night duty. Conciliation boards and other similar conferences have been abolished, and in their place councils and local committees have been established consisting of the railway officers and employees. The experience already gained has proved the usefulness of sitting round a table and discussing grievances. Just as in mediæval times a dispute over a bucket of water precipitated

a war, trifling discords have led to serious and prolonged troubles with railwaymen. There is ground for belief that the councils will smooth out misunderstandings and difficulties arising through misinterpretation of agreements.

The councils have so far been mainly engaged in considering individual grievances, although it is the intention to extend the discussions to questions of train operations and other kindred subjects of mutual interest. A number of hot-heads have made an organized attempt to discredit the councils, but their efforts have signally failed. The councils have met a long felt want of the men, as they are assured by the presence of men of their own rank at the council meetings that their grievances have had an adequate hearing.

Reductions in Rates and Fares

The policy of the railways in easing the burden of present day rail charges has been to give concessions by instalments. As reductions in expenditure on wages, coal and materials have been effected, the savings have been passed on to the public. The first consideration has been given to freight rates on minerals and merchandise, with the object of helping the revival of industry, and this policy has been steadily adhered to, although the railway companies might have gained greater popularity if they had made early concessions to the ordinary fare-paying passenger. The largest concession of the year came into operation on August 1, when an

that their finances did not warrant such large reductions, and the agreement provided that so far as the negotiating bodies were concerned, no further application would be made for rate alterations for a period of 12 months. The Coal Mining Association, the Iron and Steel Federation and other important industries who were not parties to the agreement are still pressing the managements for further reductions, but it is difficult to see how they can be conceded at the present time, having regard to the companies' statutory obligations to provide efficient rail transport. Any attempt to economize by restricting rail services would instantly land the companies into difficulties.

The position of the freight rates today is given in Table II.

British railway rates generally are now 70 to 75 per cent above the pre-war level, and they compare favorably with the average of wholesale prices which is 71 per cent higher, and the cost of living, which is 80 per cent.

In passenger rates the reductions given during the year have been in the direction of special cheap fares, but on January 1, 1923, an all-around cut of 25 per cent of the war increase will be made in the charges to the ordinary fare-paying passenger, leaving the rates 50 per cent above pre-war, or 3 cents per mile. At the same time the opportunity will be taken to remove some of the anomalies in the charges for passenger fares and to make a move in the direction of standardization of fares. This decision should facilitate the



A Large Gravity Yard at Feltham, Near London

all-round reduction of 25 per cent was made on all classes of general merchandise and a lowering of the flat rates. This reduction was arranged by agreement with the Federation of British Industries and endorsed by other leading associa-

work of the Railway Rates Tribunal when it gets to the question of revisions. First-class fares are to be reduced from six cents to five cents per mile. Cheap tickets of all descriptions will bear corresponding decreases; season (i.e., commutation) tickets will remain at 50 per cent above the pre-war charge and no alteration is to be made in the price of workmen's tickets. Rates for perishable goods by passenger train are to be reduced from 75 per cent to 50 per cent from January 1, 1923. Milk rates were reduced in May, 1922, from 75 per cent to 50 per cent above pre-war. Other minor reductions during the year were made in the rates for motors, carriages, caravans, etc., and cattle in horse boxes.

Railway Stocks Rise on Market

The returning prosperity of British railways is indicated by the steady rise in the value of all classes of stocks since the close of 1921. The railway market has been quick to respond to the valuable work done by the companies in restoring their credit. The payment of \$150,000,000 as a first instalment of the \$300,000,000 government compensation imparted a sense of security and, though stability has been secured, railway companies do not overlook the fact that

TABLE II
Maximum rate
September, 1920

Class of traffic	Maximum rate September, 1920			Today		
	Per cent above pre-war	Flat rate ad- dition	Maxi- mum ad- dition	Per cent above pre-war	Flat rate ad- dition	Maxi- mum ad- dition
Coal, coke and patent fuel.	100	\$0.12	\$1	60	\$0.04	\$0.87
Iron ore, etc., for blast furnaces	100	.12	1	50	.04	.50
Raw materials	100	.12	1	75	.06	1.00
Agricultural manure.....	50	.12	1	50	.06	1.00
Partly manufactured articles	100	.12	No limit	75	.06	1.50
General merchandise.....	100	.25	..	75	.06	..
Small parcels	150	..	..	100	..	..
Cartage and delivery rates	37 cents at each end			18 cents at each end		

tions which asked for a reduction of freight rates by 50 per cent and the abolition of post-war flat rates.

The railways were able to satisfy the captains of industry

these millions may disappear like snow in summer sun if the depression in trade is prolonged.

COMPARISON OF STOCK VALUES

	Highest 1913	December 1921	November 22, 1922
Caledonian,			
Ordinary stock	79½	31	63½
Preferred converted	59½	25½	49½
Glasgow & South Western,			
Deferred ordinary	44½	16½	33½
Great Central,			
Deferred ordinary	17½	4½	8¾
Preferred ordinary	39¾	8½	23¾
Great Eastern	63½	27	38
Great Northern,			
Deferred	57½	23½	43½
Preferred	88¾	44	68¾
Great Western	119¾	72½	106
London & North Western	136¾	70	102
London, Brighton & South Coast,			
Deferred ordinary	95	38½	63½
London & South Western	39¾	18½	33½
Midland,			
Deferred	77½	43½	67
Preferred	60¾	36	48
North British	32¾	9½	47½
North Eastern	124	72	118½

The second and final payment of \$150,000,000 is due from the government on January 1, 1923.

Railway Excursions

With freedom from the stranglehold of the coal strike and the fetters of government control, the British railways restored at one stroke many popular forms of cheap tickets and excursion trains beloved by the public.

These cheap tickets are not issued from any philanthropic motives but as a business proposition to attract additional traffic. Tourist tickets at a fare and two-thirds were restored in the early summer and proved a boon to holiday makers. The guaranteed excursion for the day or long-period (minimum number of passengers 300), a popular British institution, is again making headway. From June to October the railway companies flooded the country with excursions and no holiday resort in Great Britain had cause for complaint at being left out of the program. Although the excursion trains were run at good speed, the ordinary train service is so superior both in speed and numbers that the regular patrons of the railways are loath to take advantage of the cheaper fares, and practically all cheap train passengers are regarded as bringing additional revenue to the coffers of the companies. Cheap tickets for day and half-day excursions are now issued in about 50 varieties, many being available by specified ordinary trains. They include tickets for Boy Scouts, ramblers, members of rifle clubs, footballers, cricketers, anglers, blind ex-service men and their attendants, and country folk traveling to the market towns.

The cheap fares are based on the ordinary fare and are proportionately higher than in pre-war days. The ridiculously low fares charged on some railways before 1914 are never likely to return. Although excursion trains have been well patronized, the numbers of passengers carried are not so great as in the days before the war, nor are they likely to be so until the large numbers of unemployed are again at work.

Statistics

The railway statistics for 1921 issued in the late autumn by the Ministry of Transport are of no comparative value owing to the incidence of the coal strike, and other disturbing factors. The decline in the number of passengers from 1,141,748,517 in 1920 to 942,421,007 in 1921 is not only on account of the coal strike but also due to the fact that some millions of soldiers, sailors and officials were still being carried in 1920 on government business and ex-service men were spending their gratuities in visiting friends, and in 1921 holiday makers perturbed by the coal strike had booked accommodation by road transport months ahead. Higher rail fares were a contributing factor and unemployment and general shortage of money helped to diminish traffic. Freight traffics fell by over a hundred million tons or 31.4 per cent,

half of the decrease being on the carriage of coal. The stoppage of blast furnaces accounted for a fall of 8,638,873 tons in the carriage of iron and steel, equal to 52.2 per cent, and iron and iron-ore show the large reduction of 71.2 per cent.

In January, 1922, the railway companies resumed their practice of publishing weekly traffic returns, but no comparisons will be available until 1923. The figures do not contain particulars of expenditure.

Highway Transport Competition

The carriage of merchandise by road motors continues in large volume, and day and night the roads out of the great cities are humming with the throb of the internal combustion engine. A considerable tonnage has been diverted from rail to road but the railways are applying with success new methods for retaining existing traffic and winning back old customers. With the exception of well-established firms, road carriers are in a sorry plight, and the technical papers devoted to the industry do not hesitate to point out that unless the present system of suicidal rate cutting is stopped, disaster on a wholesale scale will overtake the road transport business.

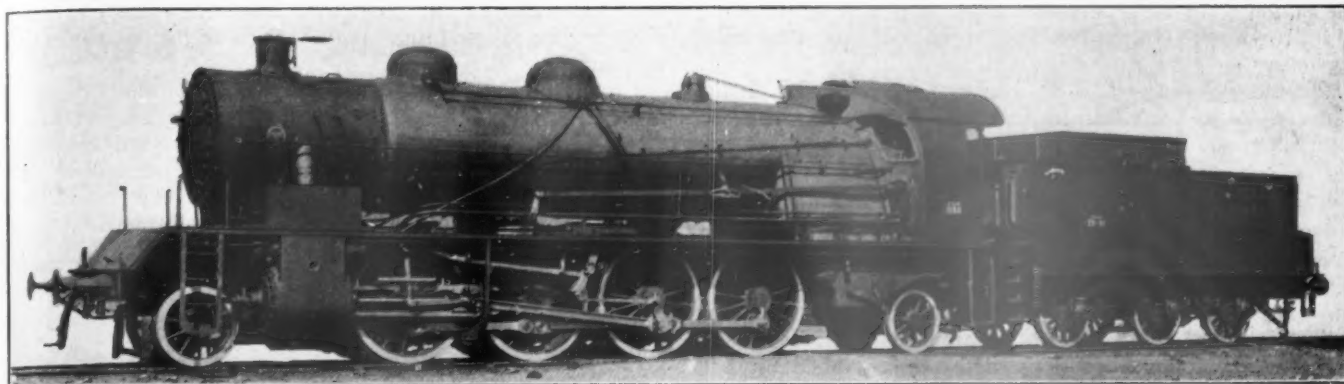
Already lists of firms in financial difficulties are continually being posted, and as increased taxation for commercial lorries is foreshadowed, the outlook is black. Local taxation due to the wear and tear of roads has increased by leaps and bounds, and local authorities are petitioning the Ministry of Transport to close roads unsuitable for heavy traffic. Local rates and taxes, which constitute a heavy burden for the companies, have increased from \$24,000,000 in 1913 to \$54,000,000 in 1921, the rise being largely due to the upkeep of roads worn out by road motors carrying traffic taken from the railways.

A spirited attempt by the London & North Western and associated companies to obtain powers to use road transport failed through the intervention of the Ministry of Transport, which sought to impose impossible conditions for the regulation of the proposed road motor services. The Ministry's action was severely criticized by a committee of the House of Commons which was favorably disposed to the proposals. The bill was withdrawn by the companies.

Motor coach business has passed through a very trying period, and traffic has fallen off to an enormous extent. Bad weather, railway competition and the fickleness of the public have put many firms in the bankruptcy court. The rosy conditions under which road transport worked in 1921 have been just the opposite in 1922. Railway excursion fares have brought motor coach fares down with a run. The motor coach business has, however, come to stay and must still be reckoned with. So far as long distance travel is concerned, there is no prospect of road motor coaches ousting the railways as the most popular form of transport. For short distances the small motor bus has become a serious rival to the railways, though the competition between ex-service men with their rough-and-ready motor conveyances for the 4-cent and 6-cent fare is so keen that they are only able to earn a bare living and are likely to go out of business.

Irish Free State Railways

The tale of the Irish Free State railways can soon be told. It is a continual record of destruction of railway property through the deplorable civil war that has been raging throughout the country. Irish railways have had to contend with every kind of difficulty, and in some sections it has been impossible at times to operate them. The only bright spot in the past year's record is the allocation of the \$15,000,000 government compensation, which should enable the companies to recoup some of their grievous losses. The commission appointed by the Irish provisional government to inquire into the operation of the Irish railways has recommended that the railways should become nationalized.



A Baldwin Locomotive on the Paris, Lyons & Mediterranean

French Railways Still Operate at Deficit

New Method of Organization in Effect—No Reductions in Labor Cost—Electrification

By M. Peschaud

DURING THE PAST YEAR the route mileage of French railroads did not change materially, but remained at about 26,000 miles, divided among five companies (the Paris-Orleans, the Paris, Lyons & Mediterranean, the Northern, the Eastern and the Southern—18,950 miles) and



Station on Alsace-Lorraine Railways at Metz

two government systems (the State, 5,600 miles, and the Alsace-Lorraine, 1,385 miles).

Physical Condition of the Systems

The magnificent effort made by the French railroads to repair the destruction caused by the war has been described in previous articles in the *Railway Age*. At present the systems have been restored and are operating as satisfactorily as they did in 1914. Some improvements have even been introduced, such as the train dispatching system, which is more particularly used on the P. L. M. (Paris-Marseilles line), the Eastern (Mézières-Charleville line) and the Paris-Orleans (Montlucon-Limoges line). Western Electric equipment has been used in these installations. Several roads are giving numerous trials to cab signals with speed recorders.

The reconstruction of rolling stock has been accomplished. Judging from the latest statistics at hand, conditions have not greatly changed during 1922, as compared with 1921.

	1920	1921
Number of locomotives in operation.....	17,428	17,729
Total horsepower of locomotives in thousands..	14,860	15,516
Number of cars:		
(a) Box	117,082	121,193
(b) Gondolas	73,642	79,103
(c) Cattle	49,322	49,207
(d) Coal	157,504	169,203
(e) Tank	673	918
(f) Refrigerator	911	1,172
(g) Baggage	16,360	16,473
(h) Miscellaneous	733	712
Number of passenger cars.....	29,321	28,612

The monthly statistics (January to September) of cars loaded on the systems (that of Alsace-Lorraine excluded) follow:

	Six systems	
Daily average	1922	1921
January	39,727	37,892
February	42,057	35,248
March	43,275	30,651
April	41,998	32,930
May	42,623	38,980
June	43,123	33,695
July	43,390	30,941
August	43,338	42,108
September	47,192	38,328

In 1913 the daily average of cars loaded was over 60,000, but the average capacity of the cars was smaller. Nevertheless, France continues to feel the effects of the acute economic crisis which it has experienced for the last two years.

In July, 1922, experiments were begun on the Paris-Orleans line with the new automatic train control device invented by the French engineer Rodolausse. This device aims to insure the following conditions: The automatic control and regulation of speed and the stoppage of a train in case it goes by a stop signal.

Electrifications

The vast program of electrification which has been described in the *Railway Age* is on the high road to accomplishment. The minister of public works opened to regular operation on January 1, 1923, the electrified line from Pau to Tarbes on the Southern system; that of Tarbes to Montrejeau will be opened on March 1, and it is hoped that the line from Dax to Toulouse (217 miles) will be ready in the summer of 1923. The motive power used can haul a 200-

metric-ton train on grades of 3.3 per cent at a speed of 30 miles per hour. On the level, the speed will exceed 50 miles an hour.

On the Orleans system, and on that of the P. L. M. the working out of the electrification program is being followed with interest.

New Lines

The piercing of the Vosges mountains is being actively pursued. The work on the Saint Dié to Saales line is being finished. As regards the line from Saint Maurice to Wesseling, final studies of the profile to be adopted are being made; and concerning the "median" traveling lines, the Superior Railroad Board in June, 1922, expressed itself favorably over the construction of the two lines connecting Saint Dié with Sainte-Marie-aux-Mines, and Cornimont with Metzéral.

The same activity prevails in the Transpyrenean region. The first locomotive reached the international station of Puigcerda on September 28, 1922. Very likely the line from Ax-les-Thermes to Ripoli will be placed in operation in 1924; that from Oloron to Quera in 1923.

Regarding the line of communication from Switzerland to the ocean, the Superior Railroad Board has decided to build a cut-off between La Jonchère and Commentry, and to make surveys for another between Commentry and Saint-Germain-des-Fossés, both being located on the Paris-Orleans system.

Deficits

Conditions, which have improved as regards the equipment, also look more promising as regards the outcome of the 1922 operations.

In Millions of Francs*					
	Re- ceipts	Disburse- ments	Net income	Charge- able to capital	Deficit
Operations in 1920:					
Private companies	4,460	5,756	-1,296	919	2,238
State Railway	936	1,494	- 558	176	734
Total	5,396	7,250	-1,854	1,095	2,972
Operations in 1921:					
Private companies	4,909	5,291	- 382	948	1,384
State Railway	1,008	1,427	- 425	192	639
Total	5,917	6,718	- 807	1,140	2,023
Estimates for 1922:					
Private companies	5,236	4,989	+ 247	1,132	914
State Railway	1,038	1,230	- 192	218	420
Total	6,274	6,219	+ 55	1,350	1,334

*Due to the fluctuations in the value of the franc, no attempt has been made to convert these figures into American money. Normally the franc is worth 19.3 cents. At present it is worth about 7.5 cents.

The decrease in the deficit is in great part due to the decreased cost of fuel.

Fuel expenditure in millions of francs	
1920	2,061
1921	1,360
1922 (estimated)	802
Corresponding tonnage in thousands of tons	
1920	8,509
1921	8,150
1922 (estimated)	8,419

Rates

The management committee of the large systems and the Superior Railroad Board have vigorously taken in hand the revision of merchandise rates; this work will be completed before the end of the year. The reductions to be brought about apply to the transportation of raw materials, long distance and export traffic, as well as traffic by solid trains. General increases (140 per cent for merchandise and 70 to 80 per cent in passenger rates) have been continued.

Labor

The number of the employees has decreased in 1922, as compared to 1921, but labor expenses have somewhat increased in view of the fact that the systems have had to pay, in 1922, the increased cost of living indemnity, which the

state had assumed previously and which the employees have collected, for the first time, as their share of the "management premium."

From the most recent statistical returns, it follows that the average salary of French railroad employees has increased 234 per cent from 1914 to 1921, while it has but increased 218 per cent in public service, and from 180 per cent to 200 per cent only in private industry. However, the cost of living shows but an increase of 202 per cent, as compared with



Valenciennes Station

1914. The increases have reached 286 per cent for beginners and they are still larger for men having children.

Modification of Application of Eight-Hour Law

According to the provisions of the decree of September 14, 1922, covering railroad employees other than the engine and train crews, the working period is still, in principle, put down at eight hours per day, but the distribution of the working hours is spread over the entire year, including therein two weeks' vacation. The number of working days being 313, the number of working hours in the year has been placed at 2,504, or 2,512 hours for leap years.

The decree establishes a distinction between the employees who perform effective work over the entire period of their day's service, and those whose work is of an intermittent nature. Regarding the first named, the length of service placed in principle at 2,504 hours per annum, is of eight hours on an average, and it cannot exceed 10 hours per day. As regards the second named, such as the doormen, the office runners, watchmen, signalmen, crossing watchmen, etc., the maximum length of the daily toil cannot exceed, depending upon individual cases, 12 to 15 hours.

There are reservations in cases of some urgent work having to be performed, either in a permanent or temporary way. It can be demanded of the employees to perform 450 additional hours per annum, in case of urgent work in order to avoid an accident, or to repair the consequences thereof; or in case of work performed in the interest of national defence, or in case of excess of work. These hours are paid on the normal scale basis, as well as the 120 hours covering the 15 days' annual vacation. The Superior Railroad Board had proposed a more radical change; viz., that for a period of seven years the working day would have been placed at nine hours by way of accommodation.

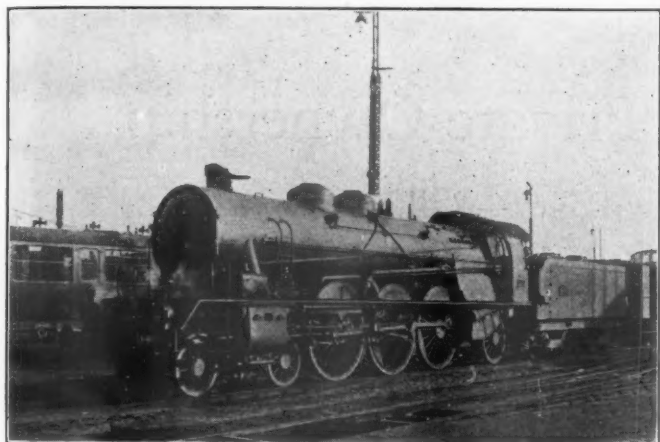
In view of the regulation adopted, the cut in the staff will not greatly exceed 30,000 employees, and that of the expenditures from 120 to 130 million francs. This is insignificant and commerce and industry manifested their disappointment when they realized that the government had stopped at such a limited reform.

In view of the poor results attained by the management of the government railways or state system, the Superior Railroad Board rejected, by a vote of 35 to 19, the continuation of government operation; it admitted the principle of "farming out."

Since the end of the war the Alsace-Lorraine system has been operated by the state, but its leasing to the Eastern Company has been agreed upon, and a law has been proposed to ratify it; all the chambers of commerce of Alsace and Lorraine (with the exception of the Strasbourg Chamber of Commerce) favor operation by the Eastern Company.

The New Régime of Railroad Control

The year 1922 will constitute an epoch in the history of French railroads, insofar as it has witnessed the application and effects of the new status of French railroads.* Although, financially speaking, the new status had its start on January 1, 1921, it was not until January, 1922, that the new or-



A Compound Pacific on the P. L. M.

ganization began to operate. Since that date, the "Managing Committee of the Large Systems" constituted in conformity with the law, has met regularly. It is the managing body of the railroads in all matters of common interest, which include all questions of importance. Above it is the "Superior Railroad Council."

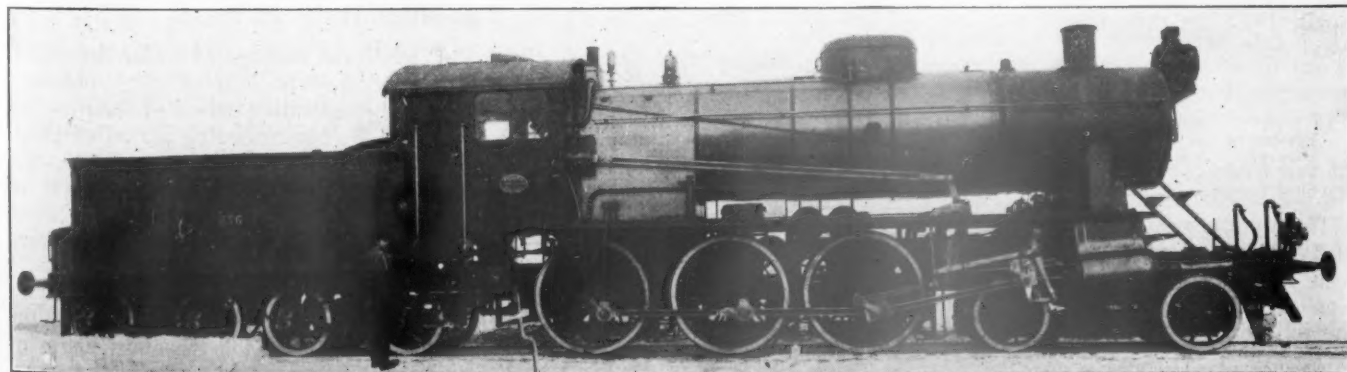
The activities of the Managing Committee have been numerous. After having proceeded with the final organization of its departments, the Managing Committee, presided over

*In connection with the new organization of French railroads, see article "Agreement on Reorganization of French Railways" published in the *Railway Age* of December 31, 1921, page 1311.

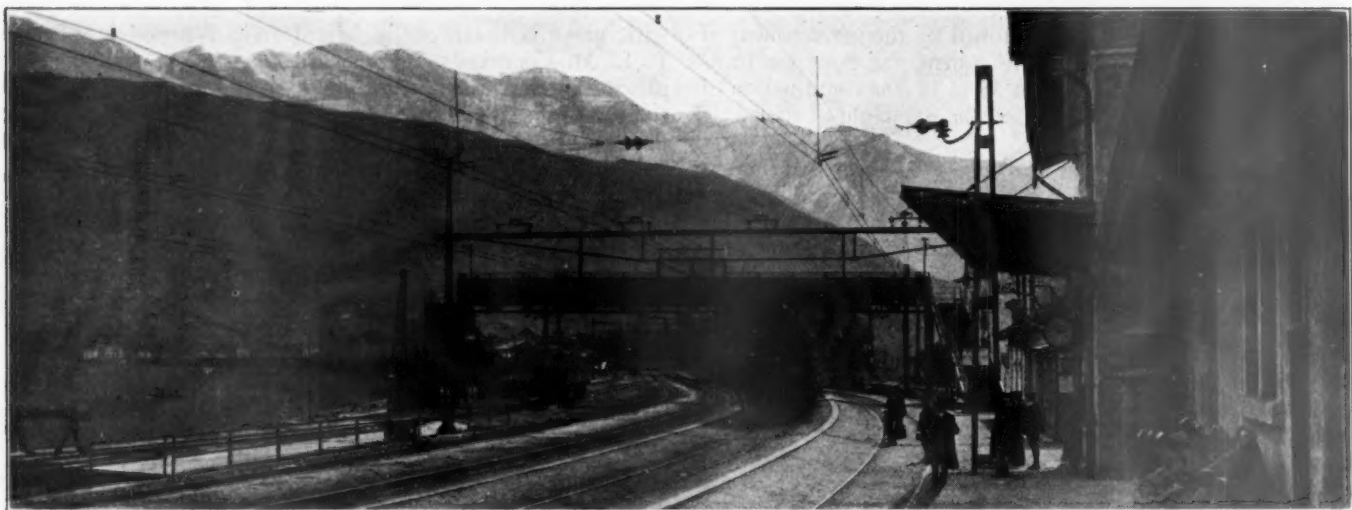
with great competence by Mr. Derville, president of the P. L. M. Company, undertook the revision of tariffs, completed the measures pertaining to the improvement of the employees' pensions; prepared rules to enforce the eight-hour law, the distribution of the premium to the staff, rules pertaining to the conditions under which passes could be delivered, and elaborated the statutes of the International Railway Union, which came to life on October 22, 1922, and which sits at Paris, under the presidency of Mr. Mange, manager of the Paris-Orleans Company. Independently of these grave problems, the Managing Committee, in the course of the year 1922, took in hand and passed upon all matters of any importance, in which all the systems were interested, and it is well known how the post-war liquidation has increased the number of these.

On the other hand, the Superior Railroad Board has rivaled in zeal the Managing Committee. The purpose of this board is to associate intimately the representatives of the nation's general interests and those of the employees with the railroads' general policy. It is made up as follows: The 18 members of the Managing Committee, representing the administrations of the railways and the 12 representatives elected by the employees (in proportion of two per system) and 30 representatives of the general interests of the nation. On the Superior Council (as also on the Managing Committee) the government's commissioner, who is the general manager of railroads attached to the Ministry of Public Works, sits. The council's power is very far-reaching; it renders decisions on all questions of common interest, on technical, commercial administration, and financial matters concerning all the systems, and furthermore, on important questions which concern one or several systems which the ministry chooses to refer to it. Mr. Mahieu, general secretary of the ministry of public works, has been appointed its president. He has taken up the following propositions (among the leading ones): The reform of the eight-hour law, revision of the main merchandise tariff schedules, distribution of the premium to the staff, and the administrative and financial reorganization of the State Railway.

All of these labors have been undertaken by the Managing Committee on the one hand, and by the Superior Council on the other, with an intense spirit of conciliation, having at heart the various interests at stake, and with a deep sense of national requirements. Without abandoning any of their autonomy, the respect of which is the basis of the new railway policy, the main systems came to an easy understanding on all matters which were considered, and thus the work of unification and of co-ordination, which constitutes one of the essential purposes of the new railroad law, was started, as was foretold by the writer a year ago.



A Norwegian Passenger Locomotive



St. Gotthard Railway on Swiss-Italian Frontier

Italy Plans Return to Private Ownership

Premier Mussolini Favors New Policy—Railways Overmanned and Poverty Stricken

By Antonio Giordano

THE MOST important problem which the Italian State Railway Administration is facing is the question of its financial condition. The seriousness of the situation is shown in the following table, which includes estimates for the fiscal year 1921-1922 in millions of lire.*

	Fiscal years				
	1913-14	1918-19	1919-20	1920-21	1921-22 (estimated)
Labor	284	797	1,266	1,850	2,000
Coal	76	526	978	1,145	760
Various	103	212	345	800	1,205
Special	113	166	193	260	263
Total	576	1,701	2,782	4,055	4,231
Receipts	603	1,693	1,937	3,021	3,285
Surplus	27	...	...	...	...
Deficit .....	...	8	845	1,034	966

In order to have a clear idea of the financial situation of the Italian State Railways, which today is the basis on which the government must work out its plans for one of the most important means of communication of the country, it is necessary to take into consideration the various items of the balance sheet for 1921-1922 which have so far been made public.

The following table shows receipts from July, 1921, to April, 1922, in comparison with similar periods of other fiscal years:

	July, 1921, to April, 1922	Same period, 1920-21	Same period, 1919-20	Same period, 1913-14
	(millions of lire)			
Passengers	947.8	997.6	739.1	230.4
Baggage	48.8	30.4	10.5	...
Fast freight	273.3	322.6	258.5	61.4
Slow freight	1,041.4	1,311.6	776.9	275.5

If only the results obtained during the first two months of 1922 are considered and if such are compared with the results obtained during the same period of 1921 it will be seen that the receipts for traffic are decreasing as shown in the following table:

*No attempt has been made to convert these amounts into American money because of the depreciated value of the lire. One lire normally equals 19.3 cents. Now it is worth about 5 cents.

Passengers	— 10.4 million lire
Baggage	— 1.9 million lire
Fast freight	— 3.8 million lire
Slow freight	— 32.8 million lire

It is true that in general during January and February there is a decline in traffic, but during the first two months of this year there should have been an increase in receipts owing to the introduction of the new railway tariff bringing about an increase of 5.72 per cent in fast freight and of 4.11 per cent in slow freight rates. During March and April of this year there was an increase in receipts from passenger traffic, but the decrease in receipts from freight traffic has continued, as appears in the following table:

	Increase or decrease over similar periods in 1921		
	January and February, 1922	March and April, 1922	Total four months
	(millions of lire)		
Passengers and baggage.....	— 12.3	+ 17.1	+ 4.8
Fast freight	— 3.8	+ 0.2	— 3.6
Slow freight	— 32.8	— 43.2	— 76.0

The increase in freight rates has not increased receipts because of the decrease in the volume of traffic.

Ton-Miles Have Increased

On the other hand, while the tonnage of traffic decreased, ton-miles increased during the first half of 1922, not only when compared with the corresponding period of the previous year but also in respect to the corresponding period of 1914. During the 6-month period January to June, 1922, the Italian State Railways handled 3,033,813,000 ton-miles† of freight against 2,913,190,000 ton-miles during the same period of 1921 and 2,628,058,000 ton-miles during the same period of 1914.

Both the fact that the increase of freight rates did not cause an increase of receipts but caused instead a decrease in the tonnage of traffic and the fact that the ton-miles have in-

†Tons-kilometer have been converted to ton-miles by the factor 0.684.

creased, show clearly that no improvement can be obtained through further increases of freight rates.

In connection with the expenses of the Italian State Railway Administration it is officially announced that there has been an excess of expenses of 789 million lire over the estimated sum of 4,231 millions. Among the various items which have contributed to this excess may be mentioned wages, the cost of new equipment and payments for loss and damage.

The Railways Overmanned

In connection with the excess of expenses for wages amounting to 266 million lire, it may be pointed out that the number of employees increased 46.6 per cent between June 30, 1914, and June 30, 1920, when the hiring of addi-



The Italian State Railways at Milan

tional employees was discontinued, *viz.*, from 147,387 on June 30, 1914, to 216,075 on June 30, 1920. In this connection it should be taken into consideration that neither the mileage of the railways nor traffic has increased to an extent to justify such large additions to the working force.

The increase in the number of employees has been caused in the first place by the application of the eight-hour law and in the second place by the political situation in Italy in 1919 and 1920, when communist ideas filled the minds of the workers, and the government in order to keep them quiet employed as many as applied in the railway service. It may be added also that soon after the armistice a great number of munitions factories closed down and the workmen who had come from rural districts and who were before the war engaged in farm work did not want to return to their former occupation but desired to remain in the towns. In order to prevent their causing trouble the government had to employ them somehow.

What the Fascisti Have Done for Italy

The Fascisti initiated their campaign among the workmen, developing the idea that the power of a nation is no doubt in its labor strength but that, on the other hand, the interests of labor are strictly connected with the interests of the nation and that if the nation goes bankrupt labor will follow and that for this reason, Italy being in a critical financial condition, labor should reduce its demands. Since this movement has gained strength the railway labor situation has improved, especially because many members of the socialist railway employees' federation joined the federation organized by the Fascisti with the above program. In this way the old railway labor organization found a strong competitor which would prevent strikes and other similar troubles to advance the conquest of the aims of some political party. This happened last July when the socialist party caused a cabinet crisis and, in order to force their entry into the government, organized a general railway strike which, however, was not

successful because railway employees had been brought to understand the situation.

This, however, does not solve the question of the influence of the wage bill on the general financial situation of the Italian State Railways.

The Rolling Stock Situation

With reference to the excess of expenses for railway rolling stock, amounting to 380 million lire, the number of freight cars at the disposal of shippers has decreased since the fiscal year 1913-1914 because of the increase in the number of bad order cars. During 1921-1922 the number of such cars was 75 per cent larger than that in 1913-1914. Under such circumstances the purchases of cars and locomotives was absolutely essential.

	Orders of the Italian Railway Administration from 1909-1914	Program for the period 1922-1927
Locomotives	1,172	450
Passenger cars	1,808	1,200
Baggage cars	1,212	250
Freight cars	26,145	6,000

The program for the period 1922-1927 is much smaller than that for the five years preceding the outbreak of the war, although there has been an increase in the requirement for rolling stock, not only because during the war the equipment was allowed to run down but also through the increase in ton-miles and the consequent increase in the work the railways are called upon to do. However, when the program for 1922-1927 was submitted to parliament the various parliamentary committees which had to examine it pointed out that in view of the financial condition of the Italian State Railways at least part of the railway rolling stock should be purchased from Germany on the reparations account.

Should the purchases of railway rolling stock be made in Germany or should orders be placed in Italy the balance-sheet of the Italian State Railway Administration would not be affected since if equipment were delivered on the repara-



Yards at Milan, Italy

tions account the treasury would have to credit the Italian State Railway Administration for the amount, and it is reported from a reliable source that the prices asked for such materials by German works, in spite of the depreciation of the German mark, were far larger than those quoted by the Italian builders.

Finally, the amount of money paid out for loss and damage, exceeding by 110 million lire the estimate made for the fiscal year 1921-1922, has increased as follows:

	Increase in total (Millions of lire)	Percent on the amount of traffic
1913-1914.....	3.9	0.67%
1919-1920.....	33.3	1.84%
1920-1921.....	97.8	3.64%
1921-1922.....	130.0	4.07%

Besides these problems the question of the construction

of new lines and electrification must be considered. During the fiscal year 1921-1922 no important railway construction or electrification has been carried out.

It is certain that many of the various projects of new construction worked out by the administration have been based not only on economical requirements but also for political reasons, particularly to satisfy the demands of certain representatives in parliament.

Some New Construction Badly Needed

However, there are new lines the construction of which is of vital necessity to the country and therefore the delaying of such construction hinders the development of Italian trade and industry. Among these may be mentioned the Predil line connecting Trieste directly with Austria; the line between Trieste and Fiume, making these two ports important transit centers in the trade between Western and Eastern Europe; the lines between Piedmont and Southern France for the development of trade between Turin, one of the most important centers of Italian industry, and the region around Marseilles; the lines in Sardinia for the exploitation of the large mineral resources of the island; the direct lines from Bologna to Florence and Rome to Naples, permitting an improvement in communication between Northern and Southern Italy; and the lines in Sicily, also to enable that region better to exploit its resources.

The Railway Administration has made detailed plans for the construction of these lines and they have been duly approved by the government, but their carrying out has been continually postponed owing to financial conditions.

The same thing may be said of the electrification projects, none of which was completed during the fiscal year 1921-1922. If electrification of all the 3,700 miles of railway according to the program worked out by Senator Riccardo Bianchi, when he was general manager of the Italian State Railways, is not an immediate necessity, it is certain that the carrying out of part of this program, or at least the completion of the work on the lines where electrification has been begun, cannot well be delayed. The same is true of the lines from Genoa to La Spezia, from Bologna to Florence and from Florence to Faenza, where smoke in the tunnels is a nuisance and a danger.

Only Two Alternatives

Under the circumstances it is quite evident that whatever efforts the Administration may make to eliminate the deficit from its balance sheet, it has only two alternatives, viz.:

1. It may reduce the number of employees, thus increasing the number of the unemployed; reduce the number of trains to such an extent as to avoid the necessity of purchasing new rolling stock and force trade and industry to develop other means of communication; and it may refuse to undertake the construction of new lines and suspend electrification, thus hindering the improvement in business conditions of the country.

2. It may turn the railways over to private companies, which, however, could avoid reducing the number of railway employees only by the development of other activities such as the construction of railway rolling stock, etc., etc.; the private companies may undertake the construction of new lines and develop electrification and in such a way not only improve the physical condition of the railways, but also increase national production, as it is thought that Italian equipment and supply manufacturers would interest themselves in the railways to insure a market for their products.

The basis of the program of the new cabinet headed by Mussolini is the transfer of some of the public utilities from government administration to private industry and from such statements it may be assumed that the government intends to choose the second alternative.

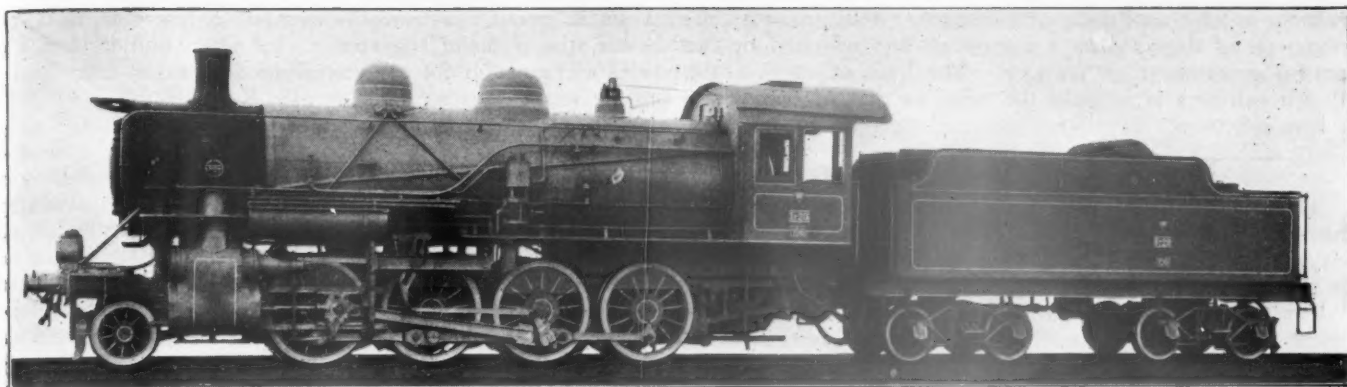
In connection with the transfer of the railways to private ownership, it is pointed out that up to 1905, when the railways owned by private companies were taken over by the government, the private companies had paid about five billion lire for the construction of over 6,200 miles of line in 60 years, while the Italian State Railway Administration has spent only two billion lire for the construction of about 3,000 miles in 17 years and with very small benefit to the government. The Italian railways had a better development while they were operated by private companies than since they were taken over by the government.

The Opportunity for American Capital

Under the present condition of exchange there is but one good opportunity for American interests in connection with railway development in Italy and that is the investment of American capital both in Italian private railway companies, some of which have already forwarded to the government proposals for taking over the operation of the railways, and in the Italian railway supply industry, which could use American machines and American raw materials and which, in view of the geographical position of Italy, could be the basis of the development of American railway interests in European countries, particularly in the Balkans.



Left—Interior of Second and Third Class Car, Norway. Right—Interior of Third Class Tourist Car



150 Locomotive of This Type Were Built by Baldwin for Poland in 1920 and Delivery on 25 More is Now Being Being Made

Polish Railways Make Great Strides in 1922

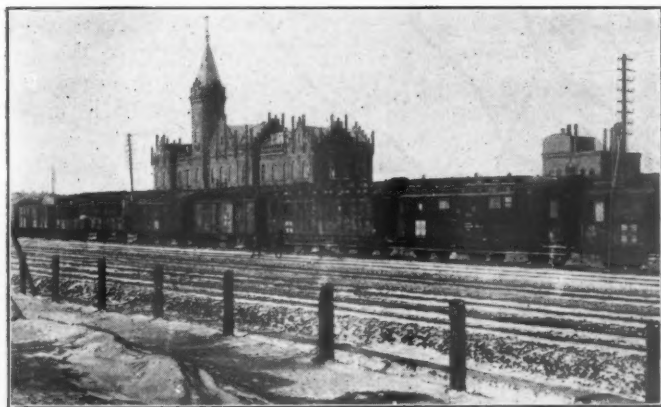
Physical Condition Much Improved and Good Service
Restored—Finances an Obstacle

By Col. A. B. Barber

FROM 1919 to 1921 the Polish railways were engaged in a continuous struggle to meet the most necessary traffic requirements and, at the same time, to strengthen the organization, rebuild and improve the property, and provide the equipment needed to care for the rapidly increasing

Baltic, her railways have relatively easy grades, few tunnels and numerous long bridges. Maximum gradients on main lines range from 0.5 to 0.8 per cent, and on secondary lines rarely exceed 1.5. In the Carpathians maximum gradients are generally less than 2.0, but on a few lines range up to 2.7. The prevailing maximum curvatures are of 800 to 1,000 ft. radius, the heaviest being 660 ft.

The soil is generally sandy and railway construction easy except in the Prypet or Pinsk marshes in the east and in certain marshy areas lying from 50 to 100 miles to the west of Warsaw. Little rock is encountered in excavation and there is a scarcity of rock for ballast, resulting in a general



Typical Freight Cars and Old Style Passenger Cars, Poland

traffic. In 1922 the results of the Poles' three years of constructive effort have become evident. The comment is frequently made that the railways are operating better than before the war. On the other hand the chronic shortage of freight cars continues and the financial record is deplorable. More than half of the receipts come directly from the Polish treasury to make up the operating deficit. The railway rates, like the Polish taxes, are, however, only a small fraction of what the traffic will easily stand and what the people, as a whole, can readily pay. With the first general elections out of the way, it is expected that the next thing on the Polish calendar will be the overhauling of the financial system of the country, including that of the principal government-owned utility, the railways.

Physical Characteristics

As Poland lies mainly in the broad river basins which stretch north from the Carpathian mountains toward the



Station at Kattowice, Polish Upper Silesia, Typical of Larger Stations in Former German Poland

use of gravel, with rock only under the rail joints. In former German Poland, however, the principal lines are rock-ballasted.

Mileage

With an area of 155,000 square miles and a population of 27,160,000 according to the 1921 census, the Republic of Poland has 10,859 miles of standard gage railways (of which 3,500 miles are double-tracked) and 2,350 miles of narrow-gage lines of many different gages. In proportion to area Poland thus has from one-third to one-half as much

senger business is normally in the western part of the country, a condition which is exaggerated today due to the extensive war devastation in the eastern districts and to the practical breakdown of Russia as a factor in international trade. Roughly, one-third of the freight traffic originates in the mining and industrial districts of Upper Silesia, Dombrowa and Krakow in the southwest corner of the country adjacent to Germany and Czecho-Slovakia. The movement from this region is the densest on the Polish railways, the bulk of it being coal, of which 12,000,000 tons are transported annually to the north and east.

A large share of this traffic falls to the so-called Warsaw-Vienna Railway, leading from the local district northeast to

East Prussia and Russia across the so-called Polish Corridor, the Polish territory extending north to the Baltic Sea and the Free City of Danzig, between East Prussia and the rest of Germany.

Car loadings during the past three years have averaged as follows:

Year	Cars loaded daily
1920.....	5,140
1921.....	7,891
1922.....	8,419

There are to be added to the above about 5,500 cars per day loaded in the portion of Upper Silesia transferred to Poland in June, 1922.

Operating Statistics

European operating statistics differ greatly from American, but some idea of the traffic on the Polish railways may be gained from the following figures for 1921, which cover 9,520 miles of line:

LASKOWSKI—Thurs Night—No. 1—	
Passengers carried	117,629,600
Average journey per passenger—in miles	59
Revenue freight loaded—tons	30,580,000
Average haul—miles	123
Trains operated	990,846
Train miles per mile of line	3,804
Gross ton-miles, passenger trains	5,126,625,000
Gross ton-miles, freight trains	9,816,335,000
Average number of car axles per passenger train	28.4
Average number of car axles per freight train	76.0
Average gross tonnage of passenger trains	247
Average gross tonnage of freight trains	636
Average gross tonnage of cars in freight trains	16.9
Ratio of loaded freight car miles to total freight car miles ..	68%
Average passenger locomotive miles per day	92
Average freight locomotive miles per day	45
Average switching locomotive miles per day	48

Organization

Like most of the state-owned European systems, the Polish railways are operated under the control of a railway ministry headed by a minister who, although generally with technical training, is a political person and depends for continuity of technical administration upon a non-political civil-service staff. Co-ordination with other branches of the gov-



Station Reconstruction Work at Zowierce, 180 Miles from Warsaw

the great textile center to Lodz, and to Warsaw. Under private operation, before its repurchase by the Russian government in 1912, this line was one of the most profitable in Europe. Today it is carrying approximately the same traffic as before the war, and is nearing its capacity with present equipment and operating methods. Similar conditions pertain to the line leading north from the coal fields to Posen, Danzig and East Prussia, and on the line leading east through Krakow to Lwow (Lemberg), Roumania and Russia.

Studies have been made of new lines, to the north from the coal districts on a direct line towards Danzig, and to the east towards Rowno, while consideration has also been given to various methods of increasing the capacity of the existing lines. However, any radical improvements involving considerable expenditures are, like many other needed betterments of the Polish railways, dependent upon the clearing up of the financial situation.

Beside the mining and industrial district just mentioned, the other principal traffic centers are: The oilfields and timber regions on the north slopes of the Carpathian mountains in Galicia, which ship largely to Germany, Czecho-Slovakia and Austria; the timber districts of Eastern Poland, shipping largely via Danzig; the areas of intensified agricultural and sylvicultural development in former German Poland and the western part of former Russian Poland; the port of Danzig; and the urban and manufacturing districts of Warsaw (pop. 931,176), Lodz (451,813), Lwow (219,193), Krakow (181,700) and Poznan (169,793).

Of the traffic in the first part of 1922, excluding that of Upper Silesia, about 40 per cent originated in former Russian Poland (pop. 15,506,339), 25 per cent in former Austrian Poland (pop. 7,724,946) and 20 per cent in former German Poland (pop. 2,948,582). The remaining 15 per cent consisted of transit traffic, chiefly from Germany to



A Later View of the Work at Zowierce

ernment and with the public is secured through an advisory state railway council and various interministerial commissions; for example, the committee for the allocation of cars.

The railway ministry is divided into the following sections: Administrative and legal, financial, traffic, operation, construction and maintenance, and mechanical. Besides in January, 1922, there was set up in Warsaw a central office for purchases and stores, outside of the railway ministry but taking over certain duties formerly handled in the ministry.

Following closely the system prevailing generally in Central Europe, operation and maintenance is entrusted to a

number of "Railway Directions," while construction of new lines and terminals is separately centralized in the hands of a "Construction Direction" in Warsaw. There is also a special organization to handle the recently-commenced reconstruction of the Warsaw terminals.

The operating "directions" are as follows:

	Direction	Standard gage line-miles	
Former Russian Poland.....	Warsaw	803	
	Radom	1,406	
	Vilna	2,604	4,813
Former Austrian Poland.....	Krakow	990	
	Lwow	1,233	
	Stanislawow	759	2,982
Former German Poland.....	Poznan	1,557	
	Danzig	1,178	
	Kattowice	329	3,064
Total			10,859

Personnel and Wages

For the standard gage lines there are about 176,000 regular employees of all classes, including overhead and shop forces. The number of employees per mile of line ranges from 4 in the Vilna Direction, where traffic is lightest, to

actively satisfactory, but that in the shops has been probably the worst in the country. Gradually, however, piece work and premium systems have been introduced in the shops, and recently a distinct improvement has been noted. Most of railway employees belong to the labor unions which in 1919 and 1920 were largely under the influence of the Socialist parties in the Diet. During 1921 and 1922, however, the unions tended to give less attention to politics, with the result that strikes have been minimized.

The Railway Budget

Due to the continual fall in exchange, railway operating costs—calculated on a gold basis—have approximated half of the prewar costs. However, this has been more than offset by the low rates, which in gold values have averaged only one-fourth of the prewar rates, so that the operating deficit since 1918 has been about 50 per cent each year. This continual deficit, which is typical not only of the railways but of the entire fiscal situation of most of the Central European countries, plays an important part in the process of inflation



A Bridge as the Germans Left It

The Central Span, Shown in the "Close-up" at Left, Was Made Entirely of Pieces That Could Be Carried by One Man

18 in the Warsaw Direction and 32 in the Kattowice Direction, where traffic is extremely dense.

Wages of Polish railway employees, like those in the other government services, change each month in accordance with a factor representing the cost of living. In buying power the wages of laborers and lower grade employees represent about the same as before the war, while the compensations of middle grade employees have about half of their prewar buying power, and of the highest grades one-tenth. In the face of parliamentary resistance to granting higher salaries to one branch of the government service than to the others, one of the most serious problems of the Polish railways today is how to provide sufficient compensations to retain the services of the senior railway officers. These competent technical men, who before the war were prominent in government or private service throughout Eastern Europe, have for four years been patriotically giving their services to the railways for a small fraction of their value or of what many of them are constantly being offered elsewhere.

Until 1922 food and clothing were furnished in kind to railway employees and their families, but this has now been discontinued. The railway co-operatives, however, continue to flourish. A comprehensive system of retirement pensions and insurance against sickness and accident was early introduced on the railways as in other branches of the government.

The efficiency of railway labor on the lines has been rel-

and depreciation of the currency. It has a most deplorable effect upon the pressing question of railway reconstruction and expansion.

Rolling Stock

The rolling stock of the Polish railways, which is estimated as about 25 per cent short of requirements, consists of approximately the following:

Received from	Loco- motives	Passenger cars	Freight cars
Germany under peace treaty.....	2,366	.....	53,000
Austria-Hungary under peace treaty.....	1,350	.....	18,000
Armistice stocks	100	.....	2,000
Russia (converted or convertible to standard gage)	100	.....	7,000
Purchased since 1919.....	350	.....	7,000
Total	4,260	8,900	87,000

The above figures do not include 150 locomotives and 2,000 Russian gage cars not fit for conversion to standard gage, or the rolling stock of Polish Upper Silesia, amounting to 430 locomotives, 770 passenger cars and 20,200 freight cars. This last item forms the Polish contribution to a pool which for 15 years is to serve both Polish and German parts of Upper Silesia under special arrangements supervised by an appointee of the League of Nations.

Among the rolling stock purchased during the past three years are included 150 Baldwin Consolidation locomotives and 4,600 United States War Department 30-ton cars delivered in 1920. An additional lot of 7,500 of these cars,

recently purchased from the United States War Department, is now in process of shipment to Danzig, where the cars are to be erected. Twenty-five additional Baldwin locomotives, of the same type as those which have made such a fine record in Poland, have been purchased for cash and are now in process of manufacture and shipment.

There is still due the Polish railways from the Central powers rolling stock for 1,400 miles of railways in Eastern Poland which those powers converted from Russian to standard gage.

Among the locomotives to which Poland has fallen heir are 143 different types, and 85 of these types are represented by less than 10 locomotives each. Nearly 500 locomotives are obsolete or ready to be scrapped.

The passenger cars include enough heavy four-axle cars of the corridor type to equip the principal express trains, leaving the old style coupé cars for local train service.

The freight cars are of all ages and types. Except for the American 30-ton cars and a few specials equipped with bogie trucks, the cars are of the usual European two-axle type of 10 to 20 tons' capacity. About 6,000 cars are in such condition that they should be scrapped at once, while considerations of operating economy would require a general replacement of the smaller cars by cars of larger capacity.

Design of Rolling Stock

Largely through the influence of the American 30-ton cars, which have scored a distinct success in Poland, the Polish railway officials have become interested in the reduction of

made stronger than heretofore, which designs have been made of 40-ton cars for coal service.

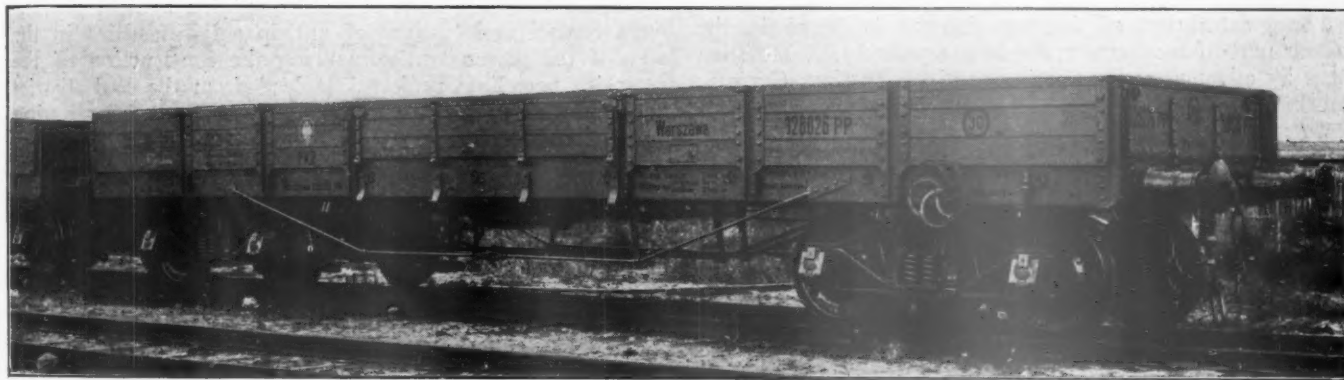
Another important development due to the American cars has been the use of air brakes on freight trains, a practice never before followed in Poland. In February, 1922, the first test run of a complete train of these cars using the Westinghouse brakes was made from the coal fields to Warsaw, accompanied by a large party of railway officers. The excellent speed and train control, and the obvious saving in personnel, made a deep impression, and succeeding months have seen a wide extension of the use of these cars with air brakes in many parts of the country.

Very few of the European type freight cars owned by the Polish railways are equipped with air-brakes. Passenger cars and locomotives have either the Hardy vacuum (Austro-Hungarian standard) or the Kunze-Knorr brakes (German standard), or both. The disadvantages and complications resulting from this mixture of brake systems, which it has not yet been possible to unify, will readily be appreciated.

Rolling Stock Program

Because of the extreme importance of securing the additional rolling stock needed, the government early made great efforts to stimulate local production. Long term contracts, generally for 10 years, designed to develop an output of 400 locomotives, 800 passenger cars and 8,800 freight cars per annum by 1926, were made with three Polish locomotive concerns and five car concerns.

Due to financial difficulty in procuring the necessary



An American 30-Ton Low Side Gondola in Use in Poland

operating costs by the use of larger equipment. On most of the main lines the standard coal train is of 50 European cars of about 700 tons net, the limiting factor generally being the length of sidings. On two or three lines, for example on the Warsaw-Vienna Railway, trains of 75 cars are used with a net load of 1,050 tons. By substituting American cars, the 700-ton maximum load can be raised to about 1,000 tons and, on the Warsaw-Vienna line, to the tractive power of the locomotives.

The largest locomotives, except a few ten-wheelers, are the Baldwin Consolidations, with a tractive effort of 35,600 lb.; that is, a little more than that of the German G8, which is more nearly than any other the standard freight locomotive in Poland. The present limiting factor in locomotive design is the maximum axle load of 18 tons (16 tons in Galicia). New bridges are being designed to take locomotives with axle loads of 20 to 25 tons, but any large scale rebuilding and strengthening of existing lines will have to await reform of the national and railway finances.

If the conditions become such as to permit a radical increase in the train load along the lines followed in the United States, a serious obstacle is likely to be found in the limited strength of the European link coupler. However, the draft gear on all new cars produced in Poland is being

machinery from abroad, two of the largest car concerns have been forced to combine resources to develop only one plant, and one of the locomotive factories has failed to materialize. These and other difficulties make it appear that little more than half of the program will be accomplished.

The official estimate of the rolling stock situation and future requirements appears as follows, the figures given being exclusive of Polish Upper Silesia:

	Locomotives	Passenger cars	Freight cars
On hand 1922.....	4,300	8,900	87,000
Required 1923.....	5,280	9,500	116,680
Required 1924.....	5,820	10,100	128,940
Required 1925.....	6,120	10,700	135,656
Required 1926.....	6,300	11,300	139,280

This program, together with the necessary replacements, calls for 2,750 new locomotives, 4,750 passenger cars and 62,000 freight cars during the next four years. Deducting the estimated Polish production and the new lot of 7,500 American cars (equivalent to 11,000 of European type), the net amount required from other sources before 1927, according to these estimates, would be 2,300 locomotives, 1,600 passenger cars and 20,000 freight cars.

The repair situation has recently shown some improvement but is still far from satisfactory. Thirty-seven per cent of locomotives, 24 per cent of passenger cars and 13

per cent of freight cars are in bad order as compared with pre-war normal figures of 17 per cent, 8 per cent and 5 per cent respectively. In spite of many locomotives sent to Danzig, Vienna and Budapest for repair, 700 to 1,000 locomotives in excess of a normal proportion have been constantly out of service. About half of the shops which the Polish railway administration inherited are hopelessly obsolete, or damaged by the war. Furthermore, in a number of cases, important shops which formerly in part served Polish lines now happen to lie just beyond the boundaries of the country; for example, the German shops at Schneidemühl, Frankfort-on-Oder (boiler shop), Gleiwitz, Ratibor and Oppeln.

Poland has in her main shops places for only 426 locomotives, besides 285 places in auxiliary or temporary shops principally roundhouse diverted to repair work. With the prevailing European shop practices the regular shops are not sufficient to take care of more than two-thirds of Poland's locomotives. The car repair shops are hardly more adequate, having places for only 1,040 cars. There is a large field for shop construction and modernization as soon as the financial situation will permit.

An effort is being made to improve the output of the railway shops at Danzig by placing them in the hands of a private company, together with the shops of the former Imperial German navy yard now devoted principally to locomotive repair. The stock of this company belongs partly to the Polish and Danzig governments and partly to private foreign capital.

Reconstruction of War Damages

The greater part of the war damage is found in the eastern part of the country which was passed over some ten times by advancing or retreating armies—Russian, German, Polish and Bolshevik. Out of 7,500 bridges and culverts destroyed, 40 per cent have been permanently repaired and the remainder temporarily. Of these bridges 250 were of spans exceeding 65 ft., with a total length of 16 miles. Sixty-five per cent of the stations, buildings, roundhouses and water-towers have been permanently restored. To complete the work, and replace the temporary by permanent reconstruction, it is estimated that four or five years will be required and an expenditure equivalent to more than \$30,000,000.

The bridge reconstruction carried out by the Polish engineers in Eastern Poland in the years 1919 to 1921 was an especially noteworthy piece of work. The salvaging and use of the remains of the old bridges was carried out so rapidly and effectively that little new material was required. This was facilitated by the fact that the Russians had carried their double-track lines over the larger streams on two separate single-track bridges side by side, and also by the fact that, on some of the double-track strategic lines, constructed by the Russians 20 or more years ago to enable them to bring their army rapidly into the "Warsaw salient," one track is now sufficient for all present or prospective needs of the local Polish traffic. The fragments of two bridges could thus be combined to make one. Some 75,000 tons of salvaged bridge steel and 350 miles of track was thus salvaged from the old Russian strategic lines and yards for use elsewhere.

Maintenance of Way

Good progress has recently been made on tie renewals of which the estimated requirement in 1921 was 5,000,000. This has been facilitated by the rapid revival of the timber industry, which in the spring of 1922 approached the pre-war volume. In the future the tie situation should offer no serious difficulty. During the past eight years very little new steel has been laid on any of the Polish lines, and it appears that, with further traffic recovery and an improve-

ment in the financial situation, there should be a heavy program of replacements. The necessary steel for this, and for any reasonable amount of new construction, will be available at low prices from domestic steel mills which, including 1,500,000 tons per annum in Polish Upper Silesia, now have a capacity of over 2,000,000 tons per annum.

Construction of New Lines

The official program of new construction, planned in 1919 and intended at that time to be executed by the government itself during a 10-year period, contemplated 2,000 miles of new lines. As the map shows, these lines were mainly intended to provide additional outlets from the mining and industrial district and to provide local service to large areas between Warsaw and the old German frontier, areas where the Russian government for strategic reasons refused all permits for railway construction. On account of financial limitations relatively little progress has been made on the construction program, the status of which is shown on the map. The completed new lines involved about 4,000,000 cubic yards of earthwork and employed a working force of 15,000 laborers. During 1922 the rebuilding to standard gage of the old narrow gage line, Nasielsk-Sierpc, 60 miles long, to the northwest of Warsaw, was practically completed. Work was also continued on a new line 71 miles long between Lodz, Kutno and Radziwie, and on a line 62 miles long to connect Plock, Sierpc and Brodnica. These new lines, involving 5,000,000 cubic yards of earthwork, are about half done and are to be completed within two years.

As a result of a turn of public opinion against government control and because of anticipated difficulties in the way of the government's financing the construction of the extensive new lines projected to lead from the coal district to the north and east, provision has been made for granting concessions for railway construction. Several temporary concessions have already been granted, but as yet none of them has been utilized.

Terminal Construction

Among the most important improvements, on which work is in progress, is the reconstruction of the Warsaw terminal system which is to be done in three stages during a period of ten years at a cost equivalent to \$30,000,000. The chief feature is a trunk line, passing through the city in an east and west direction, with a new bridge across the Vistula, the construction of which will require four years. Caisson work on the bridge piers is now in progress under a contract let to one of the principal Polish engineering contractors.

Warsaw is now served by five different passenger stations, connected by a belt line, all on the outskirts of the city, except the central or "Vienna" station. Around the site of the Vienna station is to be built the large central station of the new system and, at convenient points to the east and the west on the trunk line, are to be located suburban stations between which the traffic will be handled with electric locomotives. The traffic of the old Vienna station is now being handled in an adjoining temporary wooden terminal built in 1920-1921. Work has begun on the new permanent station which is ultimately to occupy the sites of both the old and the new temporary stations.

A considerable amount of terminal reconstruction in other parts of the country is also needed, partly on account of the new frontiers where trains stop for customs examinations, and partly because of altered directions of traffic under post-war conditions. This is especially felt in the vicinity of the Upper Silesian industrial district.

Operating Methods

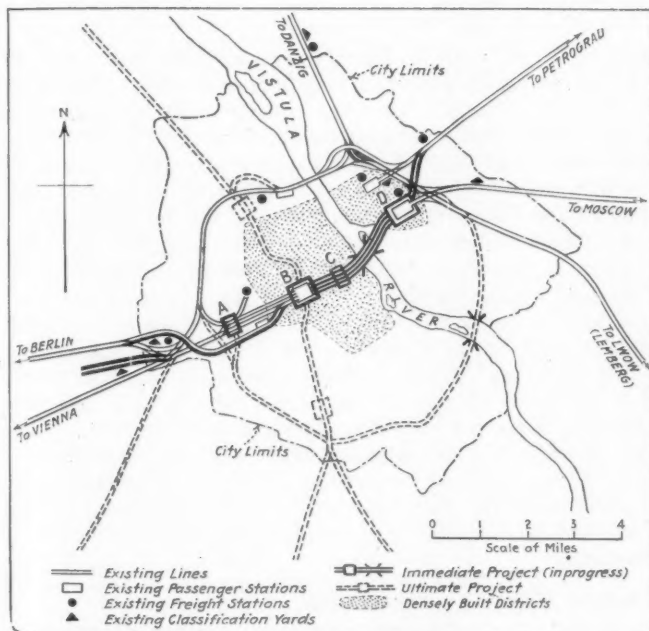
The Poles follow closely the German and Austrian practices in operating methods, with the usual concentration of

authority in the station master and the "railway direction." Only a loose intermediate inspectorate exists, presided over by three inspectors, each acting for his own branch—operation, administration or mechanical.

In Eastern Poland, where conditions are not so similar to those in Germany and Austria, distances being greater and traffic much lighter, other methods have been found more suitable. Here the railway direction is divided into six districts corresponding closely to American divisions. Train dispatching is employed, eliminating the "chef de gare" method and permitting a great reduction in personnel, often to two men, at many small stations. Americans will be interested to know that the Polish officials who have applied these practices and who handled the railways in Eastern Poland with such efficiency during the Bolshevik invasion in 1920, gained their first interest in the "American method" as a result of the visit of John F. Stevens to Petrograd in 1917.

Block Signals

The automatic block signals, with which before the war several of the more important lines in Poland were equipped, were practically all destroyed during the war or dismantled for use in Germany and so far have not been replaced. However, with the existing need for increasing the capacity of



Warsaw Terminal

East and West Trunk Line Will be Placed as Follows: A to B, Open Cut; B to C, Tunnel; C to River, High Trestle; River to D, High Fill

some of the principal lines already mentioned, there is a great field for modern signal installations, whenever the financial situation will permit.

Station Equipment

Except in some of the former German stations, switching methods and equipment are largely out of date. Locomotive coaling equipment is conspicuously absent. Water stations, on the other hand, are generally well built and equipped.

Train Delays and Demurrage

Passenger train delays have been reduced to a point that would be creditable to any country. By the spring of 1922, days not infrequently passed without a single delay of the 100 principal long distance passenger trains. This improvement was accomplished by a reasonable limitation of maximum speeds (40 miles per hour in former Russian

Poland and 55 miles in former Austrian and German Poland) and through an aggressive follow-up of the causes of each delay.

Simultaneously with work on train delays the Polish authorities actively pursued the question of expediting car movement. Heavy demurrage charges and, when necessary, the discharge of cars by the railways themselves, brought marked improvement at the unloading terminals, while through the efforts of the operating branch freight train delays were considerably reduced. There is, however, still a field for improvement in these respects.

In February, 1922, the Polish railways for the first time accepted responsibility for the full value of shipments, and during the year considerable advances were made in regard to security of shipments and handling of damage claims.

Relations With Neighboring Countries

Poland has also accomplished much in 1922 in railway relations with her neighbors. The importance of these relations may be judged from the number of her railway frontier crossings which are as follows:

- On the Polish-German frontier—48 crossing points.
- On the Polish-Czecho-Slovak frontier—9 crossing points.
- On the Polish-Roumanian frontier—3 crossing points.
- On the Polish-Russian frontier—9 crossing points.
- On the Polish-Latvian frontier—1 crossing point.
- On the Polish-Lithuanian frontier—3 crossing points.

With Germany, Poland's principal railway neighbor, a railway "convention," or treaty, as part of a general commercial "convention," is in process of negotiation. In the meantime the transit traffic across the so-called Polish Corridor has been working smoothly under a special "convention" drawn up in 1921.

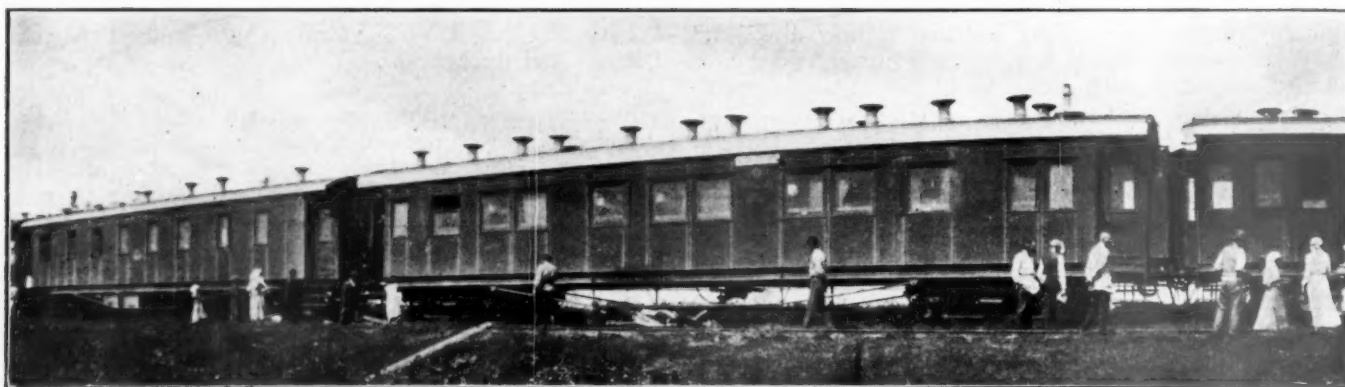
The railways of the free city of Danzig, which were turned over to the Polish Administration in December, 1921, have been united with the main system and through service has been considerably improved.

The railways of Polish Upper Silesia were transferred to the Polish Administration with the cession of that territory to Poland in June, 1922, and after two or three months of difficulties due to new conditions, inadequate frontier stations, and locomotive shortage, normal operation has been restored.

Traffic with Czecho-Slovakia, and transit traffic with Austria across Czecho-Slovakia, both of which encountered many difficulties in previous years, have worked smoothly during 1922.

In relation to Russia, local "conventions" between the adjacent Polish and Russian railway directions and the establishment of a very limited regular train service may be noted as the principal developments. At most of the frontier points both the standard and Russian gages have been extended to the first large station on one or both sides of the frontier to facilitate transfer of passengers and freight. Before the war some freight cars of the "Breitsprecher" system, with adjustable width between the wheels, were used but were not considered successful. Efforts are, however, now being made by certain foreign manufacturers to introduce similar cars in anticipation of the development of a great trade with Russia. From the Polish side there is no obstacle to traffic. The chief hindrance is the economic prostration of Russia and the Soviet government's restrictions on foreign trade.

From her geographical location Poland is naturally a transit country. Due to depressed economic conditions since the war, international traffic has been small, and the Polish railways have been able to meet its demands. In the future, however, the interest of both international and domestic transportation will require further improvement of the railways and their equipment. The key to this lies in reform of the national and railway finances.



A Train on the Trans-Siberian Stopping to Take on Wood

Russian Railways Aid Famine Relief Work

Though Greatly Deteriorated, Roads Are Efficiently Operated With Aid of Americans

By Captain Geoffrey L. Carden

WHEN the American Relief Administration headed by Herbert Hoover undertook to break the famine in Russia, it was anticipated that great difficulty would be encountered in affecting prompt dispatch of food-bearing ships in Russian ports. As a matter of fact, unloading, on the whole, was accomplished expeditiously and with little demurrage.

The crux of the Russian situation was the railroads. The immediate problem was to transport 700,000 tons of food and seed over a vast area of Western Russia. The feeding program aimed at reaching 10,000,000 people per day, or more than four times the size of the American army in France at its maximum. No amount of food commodities on the quays of Baltic and Black Sea ports would serve any purpose until transported to the famine regions, and upon the ability of the railroads to handle this traffic depended the success of the operation.

Railroads Made to Function and Famine Was Broken

And what was the result? On August 1, last, the American Relief Administration in Russia was feeding 10,496,000 persons per day. On September 1, the issue of food rations to adults was ordered discontinued. The famine had been broken.

The achievement of the Russian railroads during the year 1922 will go down in history, which will record the splendid co-operation of the Russian railway personnel working with the Americans to secure maximum service from the railways. It will tell how the well-nigh impossible was accomplished with war-exhausted railroads, with worn-out equipment and an inadequate supply of rolling stock.

The American relief personnel in Russia totaled 203. The officers and employees of the Russian railways numbered as high as 123,000. The salaries of the Russians were paid by the Soviet government, but in addition each Russian employee received from the Americans a food ration.

The Ports of Entry

Relief supplies for Russia were carried in 281 ships, exclusive of seed ships. The food supplies were landed at the Black Sea ports of Odessa, Theodosia and Novorossiysk, and at the Baltic ports of Riga, Libau, Windau; Reval and

Danzig. The port of Petrograd was used subsequent to May 20, on which date that port became ice-free. Hamburg was employed mainly as a forwarding point by steamer of parcel lots to Baltic ports eastward. The bulk of the corn-laden vessels discharged their cargoes at southern ports, of which Novorossiysk was the most important, due to its proximity to the Volga valley, the center of the famine area.

At the peak of the traffic movement American relief supplies represented about 75 per cent of the work being performed by the Russian railroads. This included the seed shipments ordered in America and purchased with Soviet gold as well as the foodstuffs for immediate consumption.

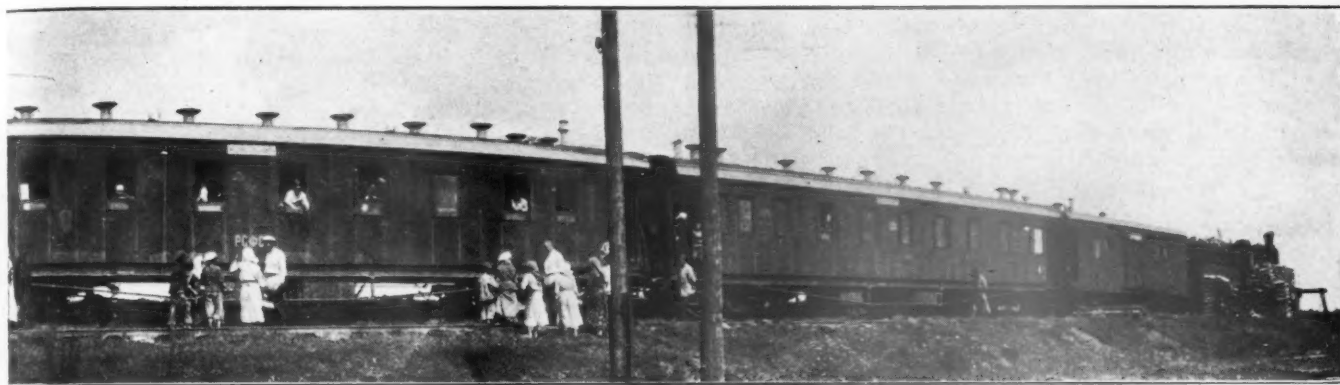
All divisions of the relief organization worked under high pressure. It was a case of saving life and, too, seed had to be delivered before too late for spring sowing. Russian authorities have estimated that 11,000,000 people were saved from death by starvation by these relief measures. Those figures are probably excessive. A conservative estimate, and one which, if anything, understates it, would be 3,000,000.

Russian Railways in Serious

Condition Even Before Revolution

Reports for 1917 show that the war had played havoc with Russian railway equipment even by that time. The Russian roads, never adequate to the normal needs of the country, had been overloaded with the added duties imposed by the military. The Russian collapse on the Eastern front during the war is generally recognized now as attributable to the lack of sufficient railway facilities. There was an absence of any system to deal with the contingency brought on by war. Russia, it must be borne in mind, assembled an army of 15,000,000 men. The up-keep of this force devolved on the railroads. The work was too much and the railways fell down both in the handling of ordinary freight traffic and in the performance of their share in the military defense of the country.

On the eve of the great war traffic density of the Russian railways had reached 1,200,000 ton-miles per mile of line. Railway construction had lagged behind the country's production. At least 30,000 more miles of railways were needed before the war began, and the war put a stop to further extensions. Equipment was allowed to deteriorate.



Conditions were bad enough in 1917 and it will be appreciated that there was not much chance for improvement in the years coinciding with the revolution.

Situation at Beginning of 1922

At the beginning of 1922, Russian authorities reported that there were approximately 6,500 locomotives in serviceable condition. In 1914 the number of locomotives in good order was about 17,000. Of the 6,500 sound locomotives at the beginning of 1922, fully 1,300 were reported as out of commission because of lack of fuel. The locomotives in service were being fired with wood. This wood lay exposed in the open and in cold weather was loaded into the tenders still covered with snow and ice. It was fuel of this character which played havoc with tubes and grate bars. According to the best information, there were 590,000 freight cars in service in 1916, including 13,000 American type cars. This represented a shortage of 80,000. At the beginning of 1922, of course, only a small percentage of these cars were in serviceable condition.

Railway Traffic to the Famine Areas

The relief administration called for 450 cars per day. This was expecting too much, but by May, the average number of cars sent out from Moscow with child-feeding supplies alone totaled 83 per day. Add to this the shipments from the Black sea and Baltic ports, and the relief administration's average car loadings ran up as high as 300 per day. In all more than 38,000 cars were loaded and dispatched by the American Relief Administration from the beginning of operations to September 11, 1922, of which relatively few were dispatched prior to March 1.

For the most part, cars were made up into 30-car trains with two additional cars for guards. This was found to be the maximum train load which was justified under existing condition of equipment. There were any number of hauls exceeding 1,000 miles as, for example, between Moscow and Orenburg, 1,005 miles; and Moscow and Ufa, through Samara, 1,069 miles.

From Moscow to Samara, in the Volga river valley, the distance is 743 miles, and this was the famine zone. Other important points in this zone were Kazan, Simbirsk and Tzantzen. To all of these points a through freight service was worked out which at times excelled, it is reported, normal pre-war schedules. This was accomplished by a personnel working with dilapidated equipment and badly maintained track. To be sure, everything was done to expedite the traffic even to the extent of making, in some instances, a single track road out of a double track line by scrapping one track and applying the good rails and ties to the other track.

The pre-war staff of the Russian railways have not deserted their posts under the Soviet regime. Many of the officers and employees are still holding the positions they have held for years, and the administrative organization,

when the American Relief Administration entered Russia, was about the same as before the war. Station masters were dispatching trains very much on their own account, much as they always have done. There was never any question as to the intelligence and attainments of Russian railway men. They welcomed the assistance of the Americans, admired their initiative, and greatly appreciated their commendation. It is a national trait of the Russians to be susceptible to kindness. They cannot be driven. They have a stick-at-it-ness about them which appeals to Americans, and in co-operation with Americans they form a combination that is hard to beat.

As rapidly as possible freight cars were made serviceable for the distribution of foodstuffs. In many cases it was a patch-up job, but the cars held. American 30-ton cars were pressed into service wherever possible, but the 16-ton, four-wheel Russian car was most generally used. The 30-car trains were based on these 16-ton cars. Guards were regarded as essential and on one occasion when troops were not available to convoy a train from Moscow, the railroad personnel volunteered to furnish a guard themselves.

Great Respect for Americans

On all relief cars the letters A. R. A. (American Relief Administration) were painted. The Russians called this "Aar-A" and that word is known over all Russia today. The Russians refer to the American as "Aar-A," and so it was that on one occasion in a far-away district when a body of bandit cavalry bore down on a freight train and saw the letters A. R. A. on the cars, horses were reined up, hats came off and the train was allowed to proceed.

In a number of instances, relief inspectors were picked up by the bandits. Invariably, the bandits escorted the Americans as far as they dared go and then bid them a friendly goodbye. Everywhere throughout Russia today the friendship of America is a living reality. It was because of this spirit that the relief organization was able to put across the biggest food movement of modern times. Experience with the Russian personnel disclosed many admirable traits, but the most lasting impression one receives is the readiness with which Americans and Russians work together. The Russian personnel was honest. There was no pilfering. Couriers sent into typhus centers never asked to be relieved.

Trains coming into Moscow with foodstuffs from the Baltic were made up in the Boina yards and dispatched to Volga valley points, the Ukraine or to White Russia points. The major movement was to the Volga and to territory in the Western slope of the Ural mountains, such as Ufa and Orenburg. Cars coming in, however, belonging to the Latvian or Estonian railways were unloaded and returned. Only Russian cars were sent beyond Moscow. All cars used out of the Black Sea ports or out of Petrograd were Russian owned.

Foodstuffs coming from Hamburg were generally shipped

to Riga by water, and when the port of Petrograd was opened, the German steamers carried the shipments to that port. Foodstuffs from Riga came direct to Moscow and from Danzig the shipments went to Stolpse on the Polish frontier. Here the food was unloaded and reloaded in cars of the Russian gage, this being the point where the standard gage track ends and the Russian 5-ft. gage begins.

Warehousing of Foods

Warehouses were established at Moscow, Petrograd, and at the Volga river cities of Rybinsk and Nijni-Novogorod. Practically all the child-feeding foods (flour, rice, beans, sugar, cocoa, canned milk and lard) were warehoused at Moscow. These warehouses were of modern construction, being built of steel and concrete. The warehouses at Rybinsk and Nijni-Novogorod were used for the storage of corn and corn grits, which were called "adult feeding." From these two river points shipments were made down the Volga by barge to Samara, Saratov, Simbirsk, Kazan and Tzantzen.

The port of Reval was found to be an excellent all year port for reaching Russian interior points, there being only about two weeks in the past year when it was closed. Traffic out of Reval could pass to Volga river points without going into Petrograd or Moscow.

All transportation expense was borne by the Soviet government. Shipments going over the Esthonian railway had to pay freight, and it was therefore advantageous to use the port of Petrograd when possible. This was done to the exclusion of the Baltic ports just as soon as the ice conditions permitted.

In the south it was found that the best port for reaching Volga valley points was Novorossiysk. This port was an important export point in pre-war days, for it must be remembered that Russia exported before the war more grain than any other nation. The railroad from Novorossiysk to Tzantzen was used by the relief administration to capacity, and at the latter place corn up to 30,000 tons was warehoused.

From Tzantzen shipments were made to points as far distant as Ufa as soon as the river was free from ice. So long as the Volga remained closed, railroad shipments were made direct to the Volga cities over lines lying to the right of that stream.

Odessa, as a forwarding point, was not advantageously situated except with reference to the Ukraine and Southwest Russia. The railroad lines run too far to the westward

and the haul to the Volga valley is too long as compared with the haul out of Novorossiysk. The port of Odessa will take vessels of 30 ft. draft and in this particular is the best Black Sea port. Twenty-seven feet is the limit at Novorossiysk. Theodosia, as a forwarding point, is the best for the Crimea and for the territory directly south of Kharkoff. The port, however, will not accommodate vessels drawing more than 22 ft. Rostof and other Azov seaports were eliminated by the relief ships owing to the filling in of the channels.

Rail Facilities of Russia and the

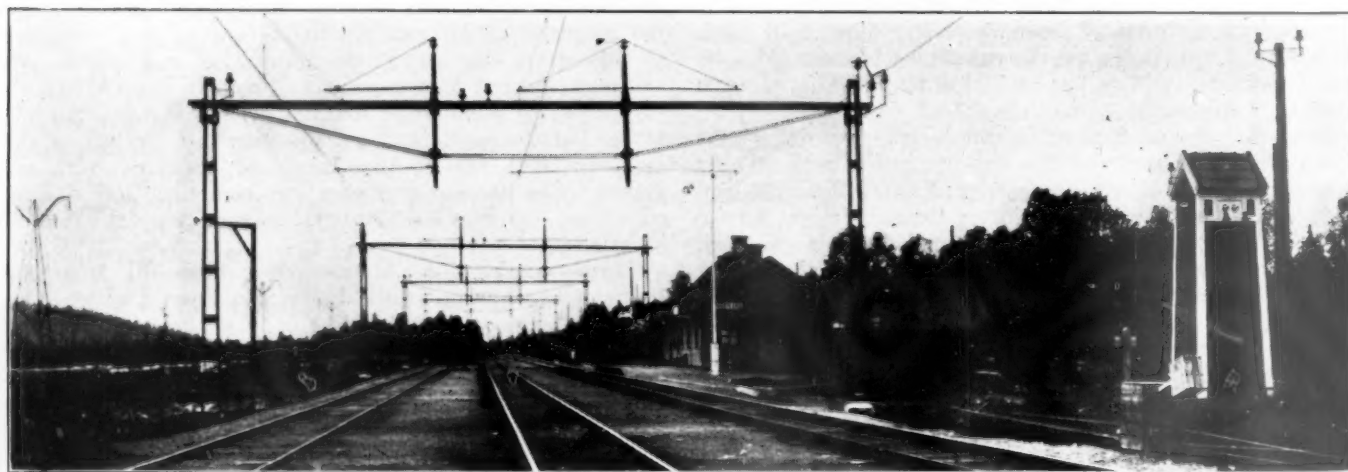
United States Compared

Russia had, at the beginning of the war, about 48,000 miles of railroad. The United States had, say, 269,000 miles. European and Asiatic Russia had an area of 8,300,000 square miles. The area of the United States, exclusive of Alaska and possessions, amounts to 3,000,000 square miles. The population of Russia and Siberia is put down generally at 150,000,000.

Of the 48,000 miles of Russian railroads about 24 per cent was double tracked and about two-thirds of the mileage was state-owned. There were more than 20 private companies and the proposed extensions were provided for both by private and government construction. Russia required under normal conditions the replacement of 2,500 freight locomotives per year and practically no replacements have been made since 1916, which gives some idea of what rolling stock shortage means today.

The Westinghouse plant at Yaroslav is one establishment in Russia which has kept up production for railway service. This plant in 1922 was running much as in pre-war days, but under many handicaps. It is badly in need, it is said, of new equipment, and the officers and employees have nursed the machine tools, many of which in normal times would long ago have been consigned to the scrap heap.

The locomotives which the Soviet government has ordered from Germany and Sweden are being received and are now seen on the express trains operating between Moscow and Petrograd, and from Moscow to other points. The Moscow-Minsk train is today first class in appointment and service. The same is true of the express trains between Moscow and Petrograd. The latter are fully up to pre-war standards and are maintaining schedules. Sleeping car service is now provided between Petrograd and Helsingfors, Moscow, Kharkof, Odessa, Rostof and Baku.



Koskivara Station, Lulea-Riksgränsen Line, Sweden



Freight Train Crossing Trisanna Viaduct, Arlbergs Line, Austrian State Railways

Some Improvement in Central Europe's Railways

Pre-War Efficiency Not Restored, However — New National Boundaries Still an Obstacle

By A. Niklitchek

VIENNA.

THE RAILWAYS of Central Europe are still suffering from the effects of the war. The managements are directing their entire attention to the restoration of the pre-war physical condition of the properties, but many causes are operating to make progress in this direction extremely difficult. Of all the obstacles, the new boundaries which were set up by the peace treaty are the most effective in delaying a return to normal conditions.

A comparison between the railway map of Central Europe of 1914 and that of today shows the extent to which the new national boundaries are hindering the normal flow of traffic. Many double-track lines used prior to the war by the fastest trains are now local lines of inferior importance, whereas main line traffic is now often carried on single-track, secondary lines. This condition is due entirely to the new boundaries which were set up under the peace treaty and it will be a long time before these lines now being used for heavy traffic can be brought up to physical standards high enough to handle efficiently the business which is directed over them. Railway stations ordinarily designed to serve small villages have become important railway centers because of the proximity of the new boundaries and the necessary customs examinations. The buildings at such places are, without exception, too small and entirely inadequate to the demands made upon them—another cause of delays to traffic.

Railways were divided up after the war according to countries in such a manner that many of the new states find themselves without adequate facilities for repairing their equipment, with perhaps a large repair shop just across the boundary line which was formerly used by them but now belongs to another railway. Rolling stock and motive power suffered terribly during the war and have not by any means been restored to normal. The various species of socialism which for a time flooded Central Europe reduced morale and discipline of the staff of the lowest level and increased measurably the obstacles to steady traffic. The situation has been further complicated by the depreciated currency and the con-

tinued scarcity of funds with which to purchase new rolling stock, motive power and other needed equipment. There is no railway in Central Europe which is prosperous—a result of the fluctuating monetary standards and the fact that wages of employees are adjusted monthly on a sliding scale according to the value of the currency, while rates and fares are fixed by the administration boards, which work rather slowly.

Train speeds are quite low—very much lower than before the war. Few “fast” passenger trains make greater average speed than 31 miles an hour and ordinary passenger trains vary in speed from 10 to 22 miles an hour. Coal is scarce and very expensive; consequently electrification is planned for many of the lines which traverse mountain districts.

The Railways of Austria

The Austrian railway system has 4,247 miles of line, only 95 miles of which is level or of a gradient less than 0.7 per cent. Five high passes from 3,000 to 4,500 ft. above sea-level are crossed by standard gage lines of this system. The heaviest gradient, 3.1 per cent, is found over the Arlberg Pass. On secondary lines, most of which are of narrow gage, there are gradients up to 5 per cent. Two-thirds of Austria's railways are operated by the state. The Southern Railway, which is the only private line of any importance, operates about one-third of the total mileage of the country.

Immediately after the war the Austrian railways were in as miserable a condition as can well be imagined. In place of the old experienced employees who had gone into military service were new employees undisciplined and entirely unfit for their tasks. Road-bed, track, buildings, cars and locomotives—everything—were in a deplorable condition. Practically nothing was done in the way of maintenance during the war and as a last straw came the treaty of peace which forced Austria to give up a great part of its cars and locomotives to the “succession” states, i. e., Czecho-Slovakia, Poland and Jugoslavia.

From 1918 to 1920 approximately 70 per cent of the locomotives on line were in repair shops. Available locomotives with cut journals or without packing in their journal boxes were frequently used. All passenger cars were overcrowded and many of them had no window panes. Pilferage and hold-ups were frequent occurrences on the railways. Indeed, in 1919 and 1920 traffic was virtually at a standstill. The only trains run were a few conveying foodstuffs to the famine-stricken cities. The acute coal shortage (which has since become an old story in Austria) was due to the fact that Czecho-Slovakia, the main source of supply, was using most of its coal locally and that Germany was shipping a good deal of coal to France on account of reparations. The few tons of coal which were mined in Austria were of an inferior quality and could not regularly be used as locomotive fuel. Some measure of relief came in 1920 when larger supplies of coal were secured from Czecho-Slovakia and Germany.

In spite of all these obstacles the railways of Austria are now operating—and quite well indeed in view of the circumstances. Locomotive conditions are considerably improved. Coal saving devices which have been applied to locomotives are giving good results. Five freight locomotives in service on the Tauern line (with grades up to 2.8 per cent), which are equipped with the Lentz poppet valve gear and the Schmidt superheater, have seen two years of hard service. The poppet valves retain their tightness for long periods with low maintenance costs and allow superheating of steam up to 842 deg. F. without difficulty in continued service and with the consumption of but little oil. The Lentz gear is said to show a saving in coal from 10 per cent (with superheated steam of 662 deg. F.) to 20 per cent (with steam superheated to 842 deg. F.) in comparison with locomotives of the same type equipped with piston valves. Eighteen passenger (4-8-0) locomotives and 12 freight (2-10-0) locomotives are to be equipped with the Lentz valve gear.

Experiments are being conducted with two systems of feed-water heaters: (1) The Rihosek waste-gas feed-water heater, located in the smokebox, and (2) the Dabeg exhaust-steam feed-water heater, the pump of the latter being driven by the side rod. The Austrian Railway Administration has ordered from Austrian concerns 65 locomotives and 30 tenders; 70 four-wheel passenger cars; 20 eight-wheel passenger cars; 30 baggage cars, and 500 freight cars.

Before the war the maximum axle load in Austria was 14.5 metric tons and the effort is being made now to increase this to 16 tons on the main lines. The reinforcement of rails, road-bed and bridges is progressing and will be finished on the main line from Vienna to Salzburg and Bregenz during 1923. This is the main line from Vienna to Germany and other European countries to the west.

The absolute dependence of the Austrian railways on coal supplies from foreign countries and the abundance of hydraulic power make electrification most desirable. Extensive plans have been prepared but the enormous cost stands in the way. Nevertheless, the work is proceeding slowly. In about two years the Spullersee power station, which is to supply electric current for extensive electrification in the western part of the country, will be completed. Existing electrified lines are of minor importance.

Vienna, the beautiful Austrian metropolis with 2,000,000 inhabitants, has seven railway stations, one for each of the seven main lines which radiate from the city. Every one of these lines enjoyed a good traffic before the war, but the dismemberment of the Austrian monarchy placed Vienna in a corner of the state instead of, roughly, at its center, and reduced the traffic on four of these lines to a minimum. Passenger traffic is now handled entirely from West Station. The facilities of this station are overtaxed and it should be enlarged, but because of the cost—a trifle in dollars, billions in Austrian kronen—this cannot be done. Most of

the Austrian railway lines run through the Alps. They are examples of a high degree of engineering skill and the scenery is marvelous.

From the financial side the operation of the Austrian railways must be almost beyond the comprehension of the American reader. The deficit expected in 1922 is 2½ trillion paper kronen (200,000,000 gold kronen or \$40,000,000). The effect of this deficit becomes evident when attention is called to the fact that the entire taxes of Austria do not amount to this sum.

The labor situation is the explanation for a large part of this deficit. The old Austrian monarchy, for political reasons, had a double management for the railways—the railway ministry in Vienna and the railway directorates in the capitals of the various constituent countries. When the monarchy was dismembered, seven-eighths of the railway system was given to the new nations, but instead of decreasing the staff at Vienna, the government has increased it to give employment to all of the railway employees and officers who were discharged and exiled from their railway positions by the succession states owing to their German nationality.

Another increase of employees has been brought about by the nonsensical interpretation of the eight-hour day doctrine. Prior to the war a great number of the "line keeper" posts on lines with only six or eight trains a day were manned by a single employee. Today the same post requires three. About 60 per cent more coal is being used now to do the same work that was done in 1913. About 20 per cent of this increase is due to the poor quality of the material and the remaining 40 per cent to bad firing. Railway employees are permitted to purchase coal at the lowest prices.

The unionized employees have secured the pass privilege, not previously granted, and public servants are now carried at reduced rates so that first and second-class accommodations are now occupied for the greater part by passengers who pay nothing or next to nothing. It is very difficult to make freight and passenger rates to conform with the fluctuating monetary standard. Meanwhile, wages are increased automatically with the cost of living. This often results in ridiculous disproportions. For example, in July, 1922, a passenger could travel from 120 to 150 miles for the price of a loaf of bread.

The annual deficit is attributable to the following causes:

Surplus of employees	\$14,000,000
Low rates	6,000,000
Poor management (non-paying trains, etc.)	4,000,000
Fuel waste	6,000,000

A deficit of an additional \$10,000,000 is met with in the absolutely essential additions, repairs and renewals. The Austrian railway problem can be solved only by solving the problem of the state of Austria, which is, in the main, the restoration of normal economic life and sound currency in Central Europe.

The Railways of Hungary

Even in the day of the Austrian monarchy the Hungarian railways had their own management and their own standards separate from those of Austria. The Peace of Trianon has reduced the Hungarian railway system from 11,780 miles to about 4,400. Hungary lost most of her valuable railway shops and all her coal mines to the succession states so that Hungary is now, like Austria, fully dependent upon foreign countries. The Roumanian invasion resulted in the destruction of 75,000 cars and 1,292 locomotives. Then came the communistic regime and, when it ended, the rehabilitation of the Hungarian lines proceeded rapidly.

The equipment shortage and the low morale of the staff are great obstacles, as they are in Austria. Another strange difficulty which adds to the equipment shortage is the great number of "wagon inhabitants." These are unfortunates

who, because of the housing shortage, cannot find homes and who have consequently taken possession of freight cars from which they cannot be dislodged. This trouble is, however, diminishing since only 870 cars were thus occupied in July, 1922, whereas in 1920 an excess of 4,000 cars had been taken over for dwellings. The Hungarian railways are not overmanned in proportion to traffic carried. Their main difficulty is the fuel question.

The Hungarian roads have an extensive electrification program which, it is estimated, will save from 40 to 60 per cent of the coal now consumed. The first electrified line will be put in service in the spring of 1923. The Hungarian railways are, almost without exception, low grade lines and their equipment is relatively heavy.

Czecho-Slovakia

To the lot of Czecho-Slovakia, the richest and most industrious of the succession states, which were carved out of the old Austro-Hungarian monarchy, fell the best of Austria's railways. Coal production in this country exceeds

many on account of reparations, as are also 400 locomotives and 7,500 cars. Maintenance of equipment is entirely inadequate and new equipment soon becomes unserviceable.

Roumania

The railways of Roumania are in a worse condition perhaps than those of any other country. Before the war they had 1,860 miles of line. The peace increased this mileage to 9,240, much of which is of the broad Russian gage. Four thousand locomotives are needed to maintain regular traffic, whereas only 800 were available in 1922. Roumania exports grain and imports manufactures. Therefore, the inadequacy of railroad facilities has caused real suffering and has brought about the unworkable policy of allowing shippers to buy locomotives or repair them and use them until they pay for themselves in freight charges. This plan has not helped matters but, on the contrary, has added to the complexity of the situation. An English company tried to install a highway motor truck service but the roads were too poor to take care of such traffic. At the present time



Orient Express Leaving West Station, Vienna

domestic needs. The fertility of the country and the stability of the government soon ended the famine which followed the war and avoided severe political troubles. Czecho-Slovakian railways are today consequently among the best maintained in Central Europe. Indeed, the country has more railways than it needs to handle present traffic.

Jugoslavia

The Jugoslavian railway system is composed of parts of the former Austrian and Hungarian systems added to the Serbian lines. The country is mountainous and a large percentage of the mileage is narrow gage. Traffic does not move well due to the lack of adequate repair shops, ties and coal. Eighty per cent of the 1,388 standard gage and 431 narrow gage locomotives are in bad order. The acute car shortage hinders the working of the coal mines and Serbian coal disintegrates rapidly when it is stored.

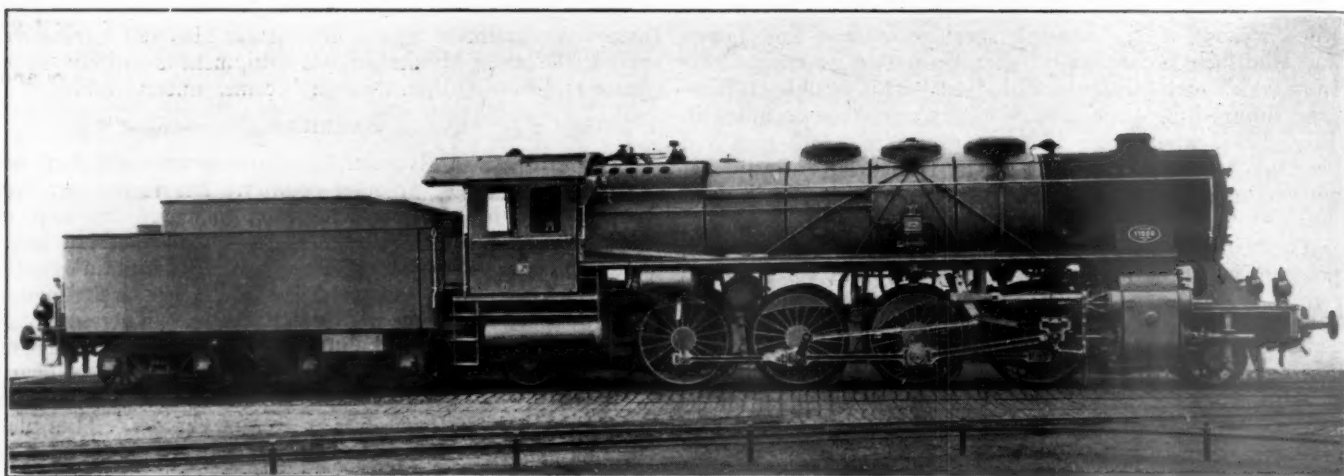
The railway employees who formerly served under three different governments are not accustomed to work together and, moreover, 80 per cent of the old staff has been replaced with new employees. Traffic rates lag behind wages as they do in Austria. Two large repair shops are due from Ger-

Austrian locomotive shops are under contract to repair 500 Roumanian locomotives and German shops to repair 1,200. Repairs for 2,278 locomotives have been arranged for in foreign shops between now and 1926, and between now and 1930 it is planned to repair 6,280 locomotives in Roumanian shops, but these shops have yet to be erected.

Bulgaria

The Bulgarian railways are in a better position than those of the neighboring countries in that they did not suffer so severely during the war and because the German management during the war carried on extensive enlargements and improvements which are helping these lines now to handle a normal business.

It is very difficult to give an adequate picture of the chaotic railway conditions in Central Europe because reliable statistics and other data are not to be obtained. All the countries suffer from the unstable currency which makes impossible a far-sighted financial program. Roumania and Jugoslavia will need, at a conservative estimate, 6,000 locomotives and 8,000 cars and a great deal of equipment for narrow gage lines in order to restore pre-war traffic.



A Mikado Type Boring for Passenger Service

First Steps in Unification of German Railroads

Uniform Track and Bridge Loading, and Standardized Equipment Adopted by the Imperial Railway System

By Dr. J. Stumpf

Privy Councillor and Professor Technische Hochschule, Charlottenburg, Germany

BY THE combination of state railways of the different federal states into the German Imperial Railway System, a far-reaching change in the railway situation has occurred, which has made itself felt strongly in the past year. The permanent way and operating equipment had to be standardized, in the first place, in order that the advantages of such unified railway systems might have full effect.

Standard Track Loading and Rail Sections

The permanent way is to be prepared and adapted for an axle pressure of 16 metric tons (17.6 short tons) on secondary lines and 20 metric tons (22 short tons) on trunk lines, within a short time, because existing rails are able to withstand these loads with a few exceptions. The bridges built since 1902 are almost without exception adapted for 20 tons axle pressure and a load of 8 tons per running metre. However, all new bridges and tracks to be laid will be made on the basis of an axle pressure of 25 metric tons (27.5 short tons). The new standard sections for rails of 16, 20 and 25 metric tons axle pressure weigh 38.9, 45.6 and 49.4 kilograms per metre (78, 92 and 99 lb. per yd.) respectively. They all have the same width of base, 125 mm. (4.92 in.), and heights of 136, 142 and 148 mm. (5.35, 5.60 and 5.83 in.) respectively.

Having in view the creation of new standard locomotive types, only two new designs have been put in service during the last year. For heavy and fast passenger train service over long uphill grades of one per cent the 2-8-2 passenger locomotive with three cylinders, four coupled driving axles and a loose or running axle in front and one in the rear, illustrated above, is used.

The front truck axle is joined with the first driving axle to form a Kraus type truck with laterally shifting rotating pins. The trailing truck axle is a radial axle. All of the three cylinders act upon the second coupled axle, developed as a driving axle with a crank displacement angle of 120 deg. The wheels of the crank axle have the tires set closer together than the other wheels.

Three-Cylinder Locomotives Widely Used

The three-cylinder system is still highly regarded in Germany, because of the uniformity of the turning movement at all positions of the cranks and because of the ease of starting. If the total cylinder displacement of a two-cylinder locomotive with a 90 deg. crank displacement angle is distributed over three cylinders with 120 deg. crank displacement, it is easy to show by a simple diagrammatic analysis that because of the uniformity of pull, there occurs an augmentation of available pulling power by fully 17 per cent. Another valuable advantage is the distribution of the forces of the two-cylinder engine, already unduly large, over three driving gears. Not only in Germany, but also in England, three-cylinder locomotives have gained many advocates in the last ten years.

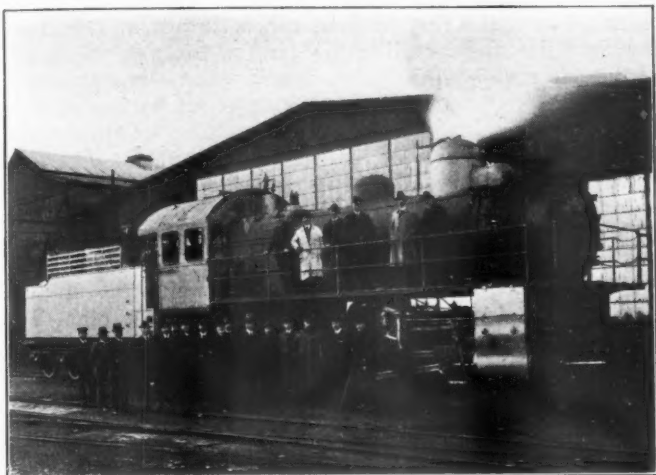
Details of 2-8-2 Type Passenger Locomotive

The frame of the locomotive is of the bar type with plates 100 mm. (3.93 in.) thick. In the middle part of the grate is a group of grate bars arranged as a tilting grate. On the superheater header an air suction valve is applied. When running light, air is drawn in, and is heated in the superheater header, whereby cooling of cylinders is prevented. In the second dome, mounted upon the long boiler, is a second feed-water heater, heated by live steam, which is constructed as a trickle-box, and which has arranged underneath it a mud or boiler incrustation separator. A feed-water heater heated by exhaust steam, which receives the water before the live steam heater, is built in above the frame at right angles to the axis of the boiler. It is fitted with straight tubes through which water flows, while the exhaust steam taken from the main exhaust fills the space around the tubes.

These exhaust steam pre-heaters throughout Germany are of the surface-heater type, because the float apparatus necessarily used with open heaters is not considered dependable, and because of fear of occasional flooding of cylinders by feed-water. These fears are eliminated, as is also a second

pump, when the surface type of pre-heater is used. Where the feed-water is bad, it is advisable to use a larger diameter for the last few passes in the tubes in order that at the point of maximum water temperature, sufficient space may be provided for boiler incrustations, which can be rapidly and conveniently removed by boring. In Germany, the practice in the last few years has been to stipulate this two-fold feed-water heater system, consisting of an exhaust steam heater and a live steam heater, for all new locomotives operated on the German Railway System. On the basis of the excellent results obtained, some foreign countries have adopted the same pre-heater system. It is astonishing what an amount of mud and incrustation is separated in the second pre-heater.

The locomotive illustrated at the beginning of the article, built by the firm of A. Borsig, of Berlin, has proved extremely



A German Built Locomotive for Russia

satisfactory in service. It hauls the longest express trains up grades of one per cent without difficulty. Speeds of 100 kilometers (62 miles) per hour have been obtained without difficulty, the perfect balancing of inertia forces by means of the three-cylinder system being very apparent.

This type, like all modern locomotives, is equipped with the Schmidt type superheater. The locomotive has the following dimensions:

Cylinder diameter and stroke.....	520 mm. by 660 in. (20½ in. by 26 in.)
Diameter of drivers.....	1,750 mm. (69 in.)
Steam pressure.....	14 atmospheres (206 lb. per sq. in.)
Evaporative heating surface.....	221 sq. m. (2,380 sq. ft.)
Grate area.....	4 sq. m. (43 sq. ft.)
Weight on drivers, about.....	68 metric tons (150,000 lb.)
Weight in working order.....	98 metric tons (216,000 lb.)
Total wheel base.....	11,600 mm. (38 ft.)
Rigid wheelbase.....	4,000 mm. (13 ft.)
Tender	
Water capacity.....	31.5 cu. m. (8,320 gal.)
Coal capacity.....	7 metric tons (7.7 short tons)
Weight in working order.....	62.8 metric tons (138,000 lb.)

A 2-8-2 tender type locomotive for service on rack rail sections was also developed. This is equipped with two rack driving wheels driven by gears from a separate steam engine. The latter works as a low pressure engine with the cylinders operating the driving wheels. The operating results of this engine were very satisfactory, as compared with the older type of 0-6-2 locomotive.

Powerful 2-10-2 Type

In this connection, may be mentioned the 2-10-2 tender locomotive built last year and doing service on the Halberstadt and Blankenburg railway, which likewise operates up grades of six per cent, but without a rack, and is able to haul larger train loads than the 2-8-2 rack locomotives before mentioned. The adhesive weight amounts to 75 tons (165,000 lb.) and since each wheel is equipped with sand pipes for both directions of travel, it is able to produce a tractive effort up to about 25,000 kilos (55,000 lb.).

The new standard types are being designed at present on the basis of an axle pressure of 20 tons. They are all equipped with the Schmidt type smoke-tube superheaters and the exhaust steam tubular feed-water heater before mentioned and live steam heater, with the latter arranged inside the second dome.

Interchangeable Manufacture on Russian Locomotives

Whereas in the last 20 years, approximately, aside from the plate pattern frame, bar frames have been used to an increasingly greater extent, the latter type has now been almost exclusively adopted. The underlying reason is the possibility of making all engine parts interchangeable, while the unmachined plate frame necessitates fitting work on the cylinders, driving box pedestals, etc. By the adoption of the bar frame, the principle of interchangeability is promoted. For a long time this idea had not progressed beyond the stage of discussion until it received an active impetus through Prof. Lomonosoff, director of the Russian Railway Commission at Berlin. In placing a large order for 0-10-0 freight locomotives for Soviet Russia, he specified that all engine parts should be interchangeable, only such fitting being permitted as could be performed with hammer, chisel and file.

This made it necessary for the preliminary work already done in the German locomotive industry to be brought to a rapid conclusion. Agreements were arrived at respecting the tolerances, and all patterns and gages were made co-operatively. To demonstrate the interchangeability of standardized parts, a locomotive was assembled in the shops of A. Borsig, of Berlin, the parts of which had been furnished by 19 German and one Swedish factory. The results of the test were extremely satisfactory; as a matter of fact, no interchangeable part required any further machine work. Owing to the employment of a plate type frame, the driving box pedestals and frame braces could not be made interchangeable, because they had to be fitted in place. However, the steam cylinders could be interchanged without any readjustment, because between the cylinder and the frame plate, there was riveted a sheet 15 mm. thick, the outer surface of which was fairly accurate.

This Russian locomotive assembled from interchangeable parts furnished by 19 different manufacturers is shown in one of the illustrations. A large number of engineers assembled at the Borsig plant in Berlin to examine this locomotive, which undoubtedly represented an important progress in locomotive construction.

Krupp Works Building Turbine Locomotive

The Zoelly and Ljungström designs of turbine locomotives have received great attention in Germany. According to reports these locomotives are operating very satisfactorily, the one in Switzerland, the other in Sweden. Both are equipped with condensers and both transmit the power of the turbine through gears to the jack shaft, whence the torque is transmitted to the driving axle through side rods.

The firm of Fried. Krupp, of Essen, which took up the construction of locomotives several years ago, has likewise taken an interest in the turbine locomotives and has one under construction.

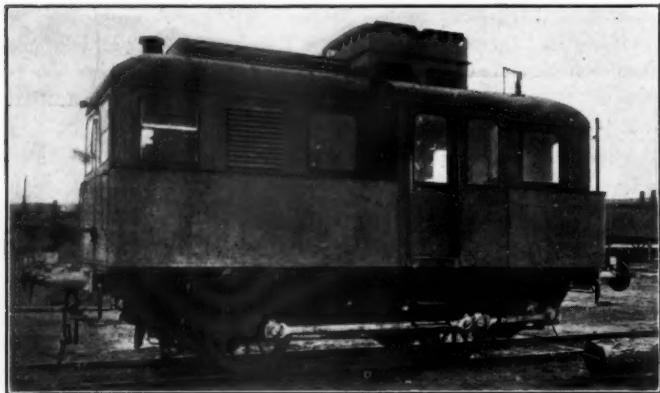
Hydraulic Transmission for Diesel Locomotives

Much attention has also been devoted to the Diesel locomotive. At this time, to be sure, only preliminary work is being done to create a large "thermo-locomotive," inasmuch as the size is restricted to about 120 hp. Electric transmission between the Diesel engine and driving axles, because of its high cost, has found little favor in Germany. However, promising developments have been made in hydraulic transmission in the design of the Lenz-gear. This gear consists of two enclosed mechanisms, the pump and the motor. The pump is of the multi-stage type and is driven at practically

a constant rate of speed from the internal combustion engine, which does not necessarily have to be reversible. The pump and also the motor may have either single or double admission.

While running, the pump conveys the fluid, preferably lubricating oil, to the motor, thus causing the motor to rotate. The volume of oil flowing through the machine depends on how the stages of the pump are arranged. The more oil the pump conveys, the higher must be the speed of rotation of the motor. The present gear has three speeds forward and one backward. If the pump is of the two-stage type, and if the large stage is twice as large as the small stage, the three speeds obtainable are as 1:2:3, according to whether stage 1 or stage 2, or both together, are working. For instance, it would be possible to travel at hourly speeds of 10, 20, and 30 km., both forward and backward.

A Diesel locomotive of the system described, equipped with the Lenz hydraulic gear, and built by the Linke-Hofmann



Diesel Locomotive Built by Linke-Hoffman at Breslau

Works of Breslau, is shown in one of the photographs. It has a rating of 120 hp. The power developed by the Diesel engine is transmitted through the Lenz gear to a jack shaft and thence to the two driving axles. The engine is said to have proved very satisfactory in operation. The Badische Motor-Lokomotivenfabrik in Mosbach has also put out a number of such Diesel locomotives with great success.

Whether the method described is the proper way to develop the thermo-locomotive cannot be decided. The design in which the Diesel engine acts directly upon the driving axle seems simpler at any rate. The Diesel engine alone is not adapted for such an arrangement but the Diesel steam engine, invented by Still, offers another solution. In such an engine steam may come into action if, or whenever, the Diesel engine fails to operate—for instance in switching and when working at maximum capacity. A steam boiler would, at any rate, be necessary in the majority of cases for the heating of cars. The next step would be to make this heating boiler slightly larger, to keep it heated by the exhaust gases of the Diesel motor, and to keep it always available and ready for use in switching, starting and forced-duty work.

Recent Developments in Car Construction

As regards the building of cars, standardized types have for the most part already been developed. The passenger cars are built entirely of steel. They are provided with arched roofs, while formerly it had been customary in Germany to use the clere-story type. For passenger trains, instead of three axles, only two-axle cars of $8\frac{1}{2}$ m. (28 ft.) wheelbase are used. Inasmuch as carrier springs with the usual leaf spring cross-section of 90 mm. by 13 mm. (3.55 in. by .51 in.) require many more leaves and consequently involve higher frictions, a new leaf section of 120 mm. by 16 mm. (4.73 in. by .63 in.) was chosen. This gives a very good spring action on the cars. In future, there will

be only two classes of compartments on the Imperial Railway lines, one with wooden seats and the other with upholstered seats, instead of the four classes formerly used in passenger trains.

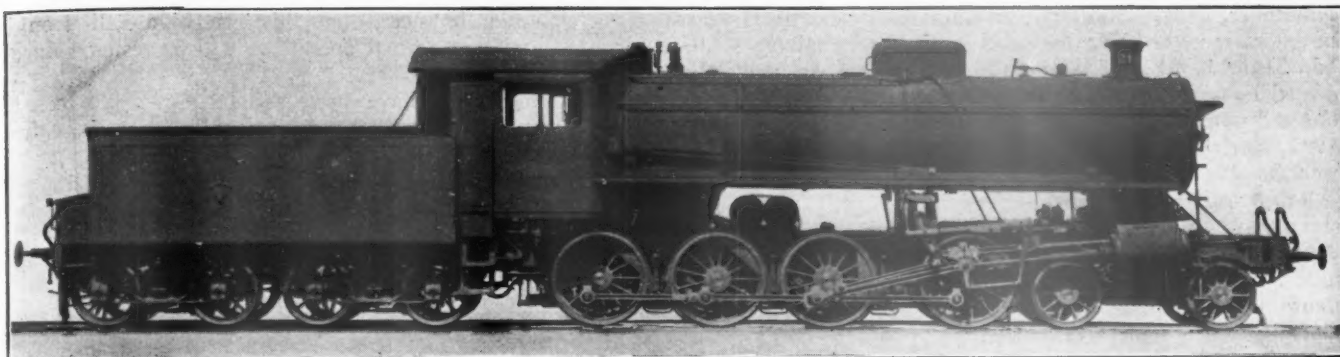
In connection with the re-enforcement of super-structure and bridges, large freight cars of 50 metric tons or 55 short tons capacity can now be used, whereas formerly with the permissible weight of 3.6 metric tons per running meter (3.9 short tons per yd.), such freight cars of 20 m. (65 ft.) length would have been too unwieldy. The new 50-ton cars that are being built at the present time do not run on trucks but on freely movable axles, a type of construction which was used as much as 15 years ago by Director Nolte of the Moscow Kazan Railway. This car has a volume of 65 cubic metres (2,800 cu. ft.). For handling bulk commodities the floor is arranged with a ridge at the center, sloping to the sides. The center floor sections can be turned over, making the floor flat and adapting the car for package shipments. In the side wall, besides the two hinged doors swinging around vertical axes, there are doors moving about horizontal axes for automatic unloading, which can be closed by tappets and shafts. The two ends of the car are stationary. The four movable axles are balanced with relation to each other, so that an ideal support for the body on three points is insured. The amount of lateral play in the axles is such that the car can safely pass over curves of 80 m. radius (22 deg.). The car is equipped with the Kunze-Knorr brake, the braking ratio for the empty or loaded car being 64 per cent. For switching a spindle type hand brake is applied, which acts upon all wheels.

In this freight car the continuous draft rod has been abandoned, as the rigid connection from the front to the rear car of freight trains led to many breaks-in-two and rendered the starting of trains very difficult. In these cars each draft hook is connected to a separate spring and therefore oscillations of cars are apt to arise in the direction of motion. In order to damp such oscillations the buffer springs are built with high internal friction. Consequently they give back only a very small portion of the energy which they absorbed during compression.

With the increasing number of cars and locomotives, the screw type coupling is constantly becoming more inadequate. For this reason large freight cars which always run in specific trains have been equipped for trial with central couplings; the most promising type appears to be that of Scharfenberg and Willison. The equipment of freight trains with compressed air brakes continues and will probably be completed in a few years.



Kattowitz Station, Polish Upper Silesia



A Norwegian Freight Locomotive

Conditions Improve on Other European Roads

Improvement Shown Largely in Decreased Deficits—
Few Roads Able to Show Profit

By J. G. Lyne

THE YEAR HAS BEEN characterized by gradually improving conditions on the railways in most European countries. This improvement is shown, however, largely by decreased deficits. High wages, high material costs and inadequate rates have combined to delay the

a deficit of \$1,215,000 during the same period of 1921. Narrow gage private lines did not fare so well this year, meeting with a deficit of \$126,000 during the first six months. This was, however, an improvement over the same period last year when the deficit was \$918,000. Sweden has 9,248 miles of railways. Of this mileage 3,420 miles, all standard gage, are owned and operated by the state. The rest of the mileage is divided as follows: 3,696 miles, standard gage, privately owned and 2,132 miles, narrow gage, privately owned.

The labor situation on the state-owned lines has been good during the past year, but there was a strike on several of the most important privately-owned lines from August

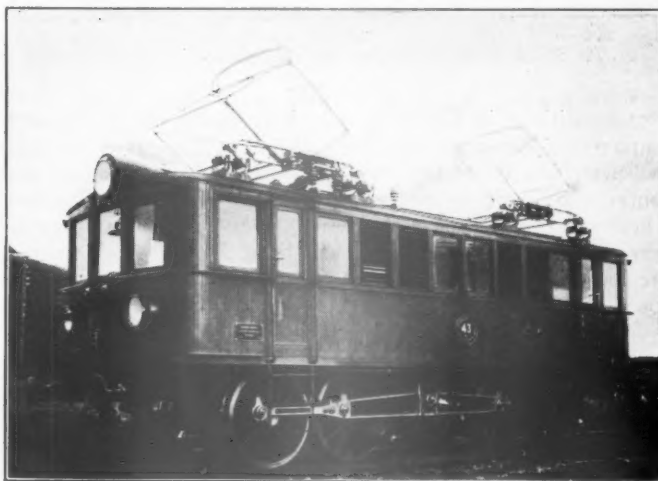


Express Train on Pianotondo Viaduct, St. Gotthard Line

return of profitable operation. Inadequate rates are especially noticeable in countries with depreciated currency. Wages and other costs mount as currency depreciates but rates, generally speaking, are far from being in ratio with the depreciated currency. Indeed, travelers tell us that in some European countries passenger rates are so low they need scarcely be taken into consideration when one is planning a journey.

Railways of Sweden

Railway conditions in Sweden have improved considerably during the year. Whereas in the first six months of 1921 the state-owned lines suffered a deficit of some 10,000,000 kroner, (about \$2,700,000), they earned a net of 4,700,000 kroner, (about \$1,260,000) during the same period of 1922. Similarly, private-owned standard gage lines earned a net of \$1,080,000 during the first six months of 1922 as against



An Electric Locomotive on the Lulea-Riksgränsen Line, Sweden

5 to October 24. Wages are divided into a basic rate, which does not fluctuate, and an "extraordinary contribution," which is changed with the cost of living. This "extraordinary contribution" has been changed considerably. For example, a railway porter or lineman on the State Railways received \$116.85 per month in January, 1921; \$91.66 in November, 1921; \$87.37 in January, 1922, and \$79.60 in

November, 1922. Similarly, an unmarried clerk of 25 years of age or more on the same dates received respectively \$180.-46, \$143.11, \$136.95 and \$125.69. Wages on privately-owned lines are not as high. For example, a clerk 25 years old and unmarried on a privately-operated line in November, 1922, received \$93.73, as compared with \$125.69 for similar work on the state railway lines.

Train service has not been fully restored to pre-war standards. In 1922 only about 75 per cent as much freight was moved as in 1914. The daily average of passenger train miles, similarly, was only about 80 per cent of the 1914 figure. Train speeds were reduced to save fuel and, while there has been some acceleration, the pre-war standard has not been restored.

A considerable mileage of line is electrified, the most important of which is the line from Luleå on the Baltic Sea to Riksgränsen on the Norwegian border, from which point a Norwegian line runs to Narvik on the Atlantic ocean. The Swedish portion of this line is 268 miles in length and on a portion of it, i.e., from Kiruna to Riksgränsen, traffic is heavier than before the war. From Kiruna south to Luleå, however, traffic has been greatly reduced because of busi-

ness conditions in Germany, which formerly received heavy tonnages of ore over this line. Another important project, the electrification of the Stockholm-Göteborg line across the southern end of the country, will probably be begun in 1923. There are now 45 electric locomotives and two motor cars in service on the Luleå-Riksgränsen line, the largest of which are handling 1,860 metric tons (2,050 American tons) at a speed of 20 miles an hour on one per cent grades.

It is expected, however, that this condition will soon be corrected and that normal operations will be restored during 1923.

Labor conditions have been satisfactory. The cost-of-living bonus which was 30 per cent of the fixed wage from July 1, 1920, to September 30, 1921, was reduced to 25 per cent on October 1, 1921, and to 15 per cent on December 31, 1921, which was the rate at the close of the fiscal year, 1922.

Of Norway's railways, totaling 2,139 miles, 87.3 per

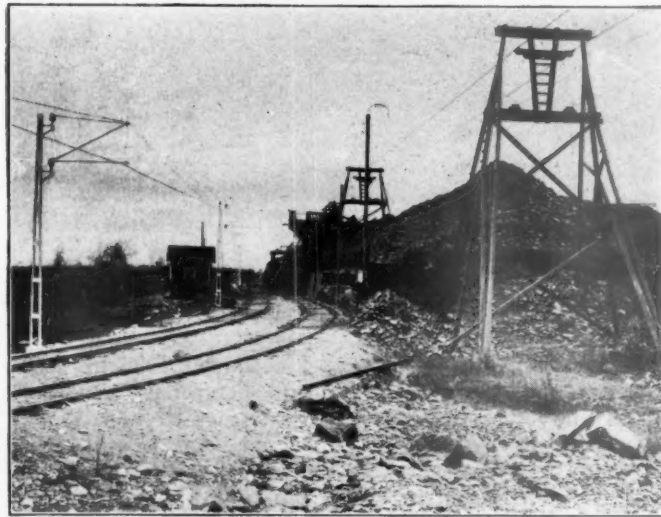


A Third Class Car for Local Service in Norway



A Third Class Sleeping Car in Norway

cent are owned by the state and 12.7 per cent by private companies. Of the state lines 34.3 miles are electrified. There are also 25.5 miles of electrified private lines. Electrification of an additional 26.1 miles of state railway line is in progress and will be completed during 1923. This line is in the northern part of the country and extends from the Atlantic ocean at Narvik to Riksgränsen on the Swedish border. The Swedish line, 268 miles long, extends from



Ore Loading Station, Luleå-Riksgränsen Line, Sweden

this point to Luleå on the Baltic Sea and is completely electrified.

Switzerland

The Swiss railways—at least the state-owned lines—had a more satisfactory year in 1922 than in 1921. The estimated excess of operating revenues over expenses during the year just passed on the state-owned lines was 34 mil-

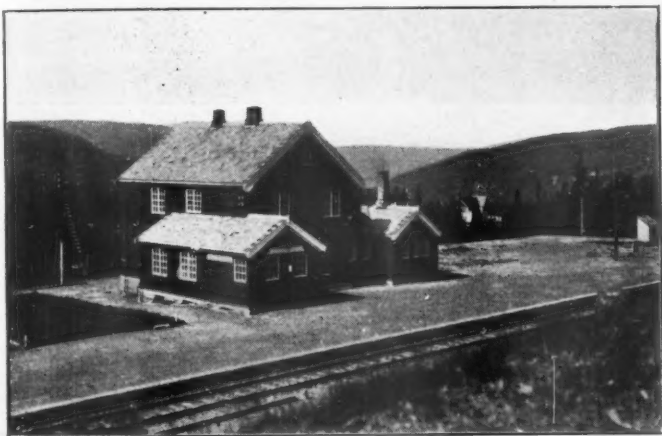
ness conditions in Germany, which formerly received heavy tonnages of ore over this line. Another important project, the electrification of the Stockholm-Göteborg line across the southern end of the country, will probably be begun in 1923. There are now 45 electric locomotives and two motor cars in service on the Luleå-Riksgränsen line, the largest of which are handling 1,860 metric tons (2,050 American tons) at a speed of 20 miles an hour on one per cent grades.

Norway's Railways

The Norwegian State Railways operated at a deficit of 5,040,328 kroner (\$1,008,000 at the present rate of exchange) for the fiscal year ended June 30, 1922, which was, however, a considerable improvement over the preceding fiscal year when the deficit was 19,594,060 kroner (about \$3,918,800). These deficits do not take into account the cost-of-living bonuses paid to employees, which totaled \$2,480,000 in the year ended June 30, 1922, as against \$3,360,000 for the preceding year.

Considerable progress has been made in the restoration of pre-war railroad efficiency. The lines in the interior are now running about the same number of trains and at approximately the same speeds as before the war. Because of conditions in Germany, however, the train services southward to the continent have not been put back on a pre-war basis.

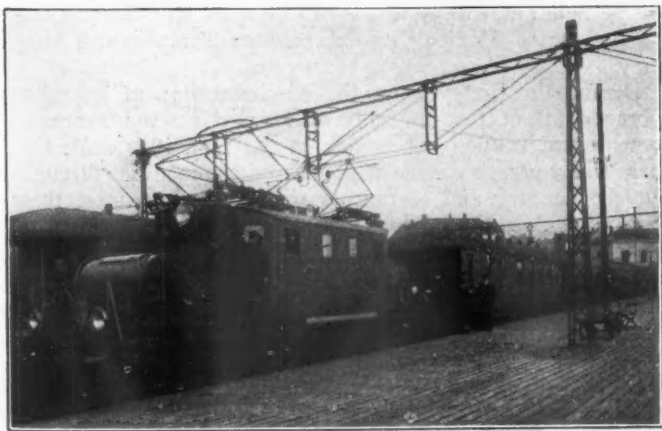
lion francs (about \$6,800,000) as against 12 million francs (about \$2,400,000) in 1921. Figures for the 1922 operations of the company-owned railways are not available at the present time, although, presumably, they also will show better results for 1922 than for the preceding year. The railway mileage of Switzerland is 3,358 miles, divided as follows: State-owned standard gage, 1,745 miles; state-owned narrow gage, 46 miles; company-owned standard gage, 550 miles; company-owned narrow gage, 944 miles; company-owned cog roads, 73 miles. Of this mileage the following is electrically operated: 134 miles of state-owned



Berak Station, Dovre Railway, Norway

standard gage; 234 miles of privately-owned standard gage; 719 of privately-owned narrow gage; 42 miles of cog road. Electrification is progressing rapidly in Switzerland. In 1913 only 2.1 per cent of all lines, state and private, were electrified; whereas in 1920, 8.1 per cent of all lines and 35.1 per cent of all company-owned lines were electrified. The State Railways are now electrifying an additional 148 miles and expect to have another 174 miles completed by 1926.

The labor situation is said to be still unsatisfactory. There have, however, been no strikes during the year. The



On the West Railway, Norway

average earnings per railway employee were 5,788 francs (about \$1,150) in 1921 as against 2,545 (about \$500) in 1913. The figures for 1922 will probably show some reduction, however. Traffic is not normal. In 1913, a total of 91,649,336 passengers were carried, whereas the figure was but 59,564,583 for the first nine months of 1922. Similarly in 1913, 14,614,781 tons of freight were handled, whereas during the first nine months of 1922 this total reached only 9,412,625.

Belgium

The budget for the Belgian State Railways contemplates a deficit for the year 1922 of about 80,000,000 francs (about \$5,600,000 at the present rate of exchange). To this operating deficit must be added 136,202,000 francs (about \$9,534,140) of interest and amortization charges, interest on sums advanced to employees as a cost-of-living bonus in 1920 and 1921, etc. There is some question as to the justification of attempting to make the railways amortize the capital invested in them. The budget for 1922 contemplates a total railway expenditure of \$64,050,000.

The railways are overmanned, the total number of employees being about 115,000, of which some 26,000 are temporary. Wages have not, however, been excessively increased and some technical positions for this reason have been hard to fill. The hope for savings lies in decreasing the personnel. One step in this direction is the simplification in accounting which is planned. Lower fuel expenditures are looked for due to decreased prices and greater economy in use secured by the payment of bonuses to employees for good records. Freight rates average about 200 per cent above pre-war.

The "extraordinary" budget for 1922 included, in addition to the sum set aside for a cost-of-living bonus to employees, the sum of 84,334,000 francs (about \$5,903,380)



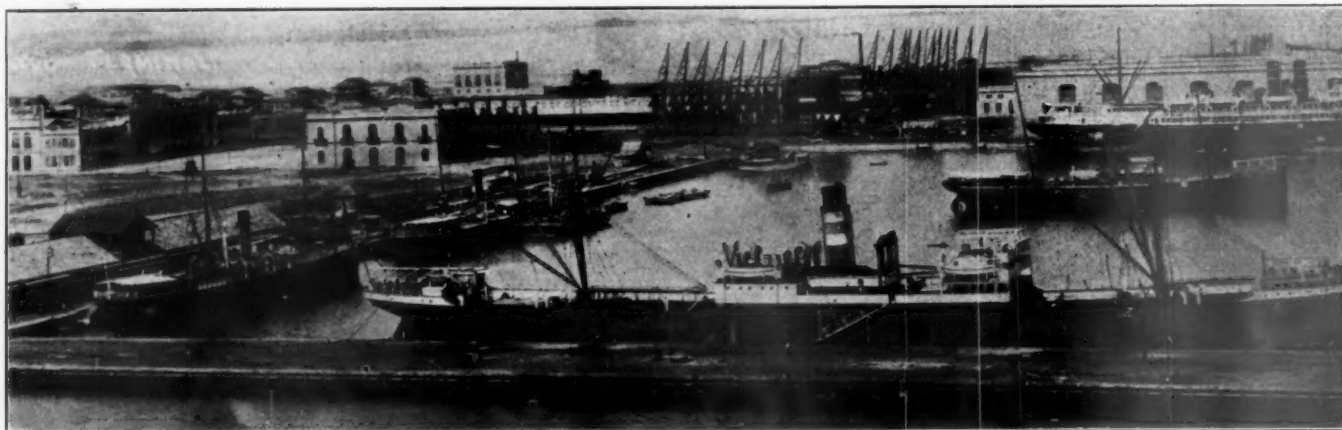
The Village of Wassen on the St. Gotthard Line

for new construction and war repairs. Some of the projects are the four-tracking of the Malines-Antwerp, Liège-Chênée, Namur-Luttre and Brussels-Namur lines and the West Brussels Belt Line.

Spain

There has been some little improvement in the Spanish railway situation, as reflected in the quotations of railway stocks in the market, due to the prospect of some net earnings resulting from the declining fuel costs. Another factor in the improvement has been the virtual shelving of the Railway Bill, which provided for what is practically government control.

Adequate increases in rates have not been allowed, but increases in wages were ordered by the government, which agreed to reimburse the companies for the added expense thus made necessary, until earnings should return to the 1913 basis. The government made this concession to avoid increases in rates. As yet there is no prospect of a return to 1913 earnings and wage reductions are not likely. Hence, the government will continue to face an annual expenditure of some \$15,000,000 from the public treasury until such a time as it sees fit to increase railway rates.



Harbor at Vera Cruz

Railway Mileage in Mexico Still Inadequate

Improved Efficiency—Radicalism of Labor—Need for New Lines and Equipment

By W. D. Hornaday

NO FEATURE of the industrial life of Mexico has undergone more changes during the last 12 years than the railroads of the country. The transformation that has taken place in the method of operating these lines of transportation may be said to have had its beginning during the few last years of the administration of the late President Porfirio Diaz. Up to within or about five years of the beginning of the revolutionary period in 1910 foreign capital and foreign men absolutely dominated all of the railroads of Mexico.

With the putting into effect of the policy of government control by majority stock ownership of many of the lines there arose a clamor on the part of a large element of the Mexican people against the further employment of Americans and other foreigners in any position on the system. This agitation resulted in the ousting of thousands of Americans who were conductors, engineers, station agents, shop foremen and skilled employees, and the filling of their places by Mexicans. The work of employing Mexicans to the exclusion of foreigners upon the National Railways of Mexico, the government-owned system, had been only fairly started when the overthrow of the Diaz administration took place. The policy of "Mexico for the Mexicans" was carried on with still greater vigor by the administrations that succeeded the Diaz regime. All American officials from the president down were succeeded by Mexicans.

Great Progress in Restoring Efficiency

It was but natural that the placing of the government-owned system in the hands of inexperienced men should lead to much confusion and more or less inefficiency in management. During the several years that the different revolutions were being waged not only the National Railways, but various other privately owned properties were subject to a veritable riot of vandalism on the part of revolutionists, bandits, and even non-combatants. Thousands of railway cars were burned, stations were destroyed, station buildings were burned, bridges dynamited, tracks torn up. It was not until Obregon became president that the rehabilitation of the railroads of the country was started.

Considering these facts and the short time tranquility has

been established, surprising progress has been made toward bringing the railroads up to a semblance of their former efficiency, both as to their physical condition and their management. Much still remains to be done, however, before the railroads are brought up to the standard that will make them equal to the traffic demands of the country. There is still a great shortage of equipment. It is estimated that an additional sum of not less than \$25,000,000 is required for improvements preparatory to turning the National Railways back to the operating company. It may be some time before this transfer is made, as the money for improvements is not in sight. The trunk lines have all been placed in fairly good physical condition. This is especially true of those parts of the National Railways which run between Rio Grande border points and Mexico City and between Tampico and Monterey.

During the first year of the administration of President Obregon all of the railroads of Mexico showed enormous increases of traffic, due largely to the fact, it is said, that there was a great shortage of goods and commodities throughout the country and shipments were rushed to meet these demands. Also there was a general revival for a time of industries, especially mining. During the last several months Mexico has been passing through an economic crisis. Merchants have bought goods only in sufficient quantities to meet their urgent needs. While mining is still active, ore shipments are not as heavy now, it is explained, as they were 18 months ago. Most of the output of the oil fields of the Tampico region is exported by water and this product affords little traffic for the railways of Mexico.

Radicalism of Labor

Along with other retarding factors in the matter of re-establishing itself which the National Railways has had to contend with during the last few years has been the radicalism of its employees. The first unionizing of Mexican railway workers took place just before the revolutionary period began. This solidifying of the employees, all the way from the trainmen down to the track workers, has been thoroughly accomplished during the last few years. It is commonly reported that there is a large element of communists among the

employees of the National Railways. President Obregon, however, holds a strong hand over them. This has been evidenced from time to time since he became head of the government.

There has been no serious strike of employees of the National Railways since 1920, although there have been abortive attempts to tie up traffic since that time. No foreigners are employed in any capacity where the unions are in control. Since 1920 wages of employees, not only upon the National Railways, but upon the private-owned systems, have been slightly reduced. Wages are supposed to be regulated on a basis of the cost of living, but this rule is said to be little observed. No policy for pensions or sick insurance for employees is in operation.

Mexico Owes Her Railways to Foreign Capital

It was American and British capital that paved the way for whatever industrial progress has been made in Mexico.



On the Tampico-San Luis Potosi Branch of the Mexican National

By means of the construction of railroads, cities and towns were given modern transportation connection, mining camps that had been worked by primitive methods for many decades perhaps were given outlets for their ores and large areas of agricultural land were made capable of being commercialized through the new opportunities that were afforded for the marketing of their crops. It was during the 25-year period preceding the overthrow of the late President Diaz that most of the railroad construction took place in Mexico. Liberal subsidies by the government were granted for building most of the railroad mileage during that period. The amount of the subsidy was governed largely by the importance of the proposed line and the cost of the construction work. It ranged from \$6,000 to \$12,000 per mile and in some instances exceeded the latter figure.

Several groups of American and British financial interests were the owners of practically all of the railroads of Mexico at the time José Yves Limantour, minister of finance, conceived and put into practice the policy of government control through majority ownership of stock of the principal roads of that country. Mr. Limantour was given a free hand by President Diaz and the Mexican Congress in the matter of acquiring on behalf of the government such lines as he might consider necessary for the fulfillment of the plan for government control of the railroads. One by one he brought the larger systems into the merger, and there was formed a corporation with an American and Mexican board of directors, called the National Railways of Mexico. There were brought into this system through the direct efforts of Mr. Limantour the Mexican National, the Mexi-

can International, the Mexican Central, the Hidalgo & Northeastern, the Interoceanic, the Coahuila & Pacific, the Mexican Southern, the Vera Cruz to Pacific, the Vera Cruz to Alvarado, and the Pan-American Railroads. Not all of them entered the merger on an equal basis in the matter of stock ownership, it is stated. Of these several component lines all were American-owned with the exception of the Interoceanic, the Mexican Southern and the Vera Cruz to Alvarado, which were British enterprises.

Previous to its merger into the National Railways of Mexico the Mexican Central had for several years been pursuing a policy of expansion both by the construction of extensions of its system and the purchase of independent lines. Among its important acquisitions were the Monterey & Mexican Gulf, which ran from Reata through Monterey to Tampico, and the Mexico, Cuernavaca & Pacific which ran from Mexico to the Balsas river. At the time the Mexican Central was taken over by the government it had also just finished the construction of a line from Guadalajara to the Pacific port of Manzanillo. Another branch line of the Mexican Central which was built not long prior to its passing out of the control of American interests was that running from Jimenez to Parral.

The Mexican International, which was a Southern Pacific property, was also in the midst of carrying out expansion plans at the time of its absorption by the government. It was competing actively with the Mexican Central in gridironing with branch lines the north central part of the country, especially the region adjacent to Monterey, Saltillo and Torreon. With these several lines forming a part of one connecting system the government brought under its control, through majority ownership, approximately 8,200 miles of main track.

In addition to this the government owned at that time the National Tehuantepec Railroad, 188 miles long, spanning the Isthmus of Tehuantepec and connecting the Gulf port of Coatzacoalcos, now Puerto Mexico, and the Pacific port of Salina Cruz. This trans-isthmian line, however, was being operated under a 51-year lease by the British contracting firm of S. Weetman Pearson & Son, Ltd. This lease was cancelled by the late President Venustiano Carranza.

At the time that the revolutionary period began the National Railways had just barely started the building of a line that was to connect the old Hidalgo & Northeastern with the Tampico-Aguas Calientes division near Tampico, thus forming a direct and short line between that port and Mexico City. It also had under consideration other important new lines and extensions.

Besides the National Railways there were still a number of important independent railways that were actively building extensions. One of these was the Southern Pacific which had built its road down the Pacific coast from Em-palme near Huaymas to Acoponeta, giving it a through rail route to the United States via the Nogales gateway, the old Sonora railroad running from Nogales to Guaymas having been acquired by the Southern Pacific from the Santa Fe some years before.

The Mexico Northwestern, which runs between Juarez, opposite El Paso, to Chihuahua, is a British-owned property, and at the time the revolutions began it was actively extending its line. The same is true of the Kansas City, Mexico & Orient, which was originally planned to run from Kansas City to the port of Topolobampo on the Pacific coast to Mexico. Construction of all of these projects ceased soon after internecine warfare started.

Mexico Still a Field for Railway Construction

Not the richest parts of Mexico are penetrated by the existing lines of railway. There are vast areas of undeveloped agricultural lands, commercial forests and districts

that are known to contain enormous mineral resources which are as yet far removed from railway transportation facilities. In traveling from Rio Grande border points to Mexico City over the two trunk lines of railway one gains very little true knowledge of the natural wealth of Mexico by what is seen from the car windows. These two roads traverse for the most part a desert, desolate plateau region. It is away from the railroads, except in the case of a few of the lines such as the Southern Pacific of Mexico and the roads that traverse the tropical parts of the country, that the natural resources, which have as yet been little developed, are to be found.

When a temporary check was put to the expansion of the railroads of Mexico by reason of the revolutionary turbulence there was in sight important extensions of these transportation facilities. Even during the revolutionary period, and with more or less interruptions since the administration of President Obregon had its advent, there has been in progress the building of a few new lines of railway as additions to the National Railways of Mexico system. This work is done for the most part to give employment to idle natives. One of these lines runs between Durango and Guiterrez, a station on the former Mexican Central just north of Zacatecas. The road is about 160 miles long. It is said to be practically finished, but for lack of rolling stock its operation is irregular.

An extension of the branch line of the former Mexican International from Cuatro Ciénegas to Sierra Mojada, about 100 miles, has been under construction for several years. At Sierra Mojada it will connect with the Mexican Northern Railroad which runs to Escalon, a station on the Mexican Central division south of Chihuahua. The Mexican Northern was built primarily for the purpose of affording a transportation outlet from the mines at Sierra Mojada. Another new line that is to form a part of the National Railways is being built from Allende to Villa Acuna, opposite Del Rio, Texas. This branch line will be about 75 miles long. Originally the Mexican National and several other lines that now comprise the government-owned system were of narrow gage. These have been for the most part changed into standard.

The Mexican (Vera Cruz) Railway

The Mexican Railway, the main line of which runs between Mexico City and Vera Cruz, 264 miles, is British-owned. This road has unusual historic interest. It is also noted as a scenic route. The concession for building the line was originally granted by the Mexican government in 1837 and was renewed in 1842. It was constructed in part by private capital and by government funds. It was not until 1864, however, that the Imperial Mexican Railway Company, Ltd., was organized and took over the uncompleted line. In 1867 the Mexican Railway Company, Ltd., succeeded the original company and completed the road in 1872.

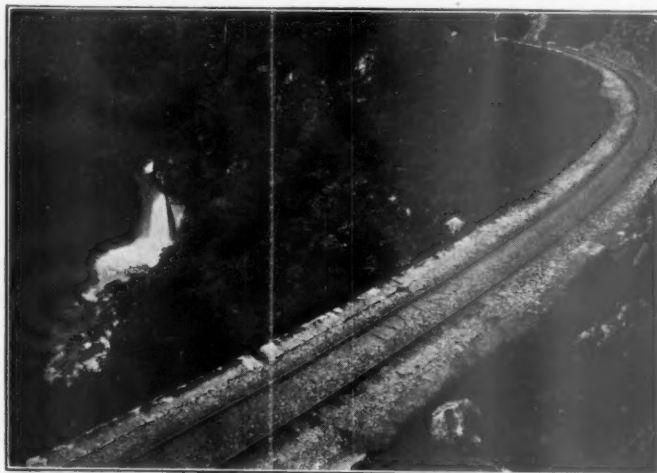
On January 1, 1873, the line was formally opened. In addition to the main line of 264 miles there are branch lines which bring the total mileage of the system up to 460 miles. The British interests which own the Mexican Railway obtained a concession from the Mexican government a few months ago for the construction of a short line from a point on its system in the state of Pachuca to Tampico. It is stated that preparations for building this road are now well advanced.

The Southern Pacific's Plans

The Southern Pacific Railroad of Mexico, the completed main line of which—828 miles—runs from Nogales to Acaponeta, plans to carry out its original concession, which calls for the completing of the road from Acaponeta to Orendain, 247 miles. The Orendain connection will be made with the Ameca division of the National Railways that runs to

Guadalajara, 25 miles. Besides the main line there are important branch lines in the state of Sonora. It is stated that the claim of the Southern Pacific of Mexico against the Mexican government for damages and losses during the revolutionary period is \$12,000,000 United States currency; and that on the payment of this claim the construction of the extension from Acaponeta will be started. The Southern Pacific of Mexico has re-established regular traffic, and during the last several months has handled unusually heavy shipments of various kinds of products grown in the valleys of the rivers that are tributary to its lines. The physical condition of the property is being constantly improved.

The United Railways of Yucatan, a part of which system has a gage of 3 ft., and a part 4 ft. 1½ in., suffered its quota of losses during the revolutionary period. This system is isolated from all of the other railroads of Mexico.



Falls of Atoyac on the Mexican National

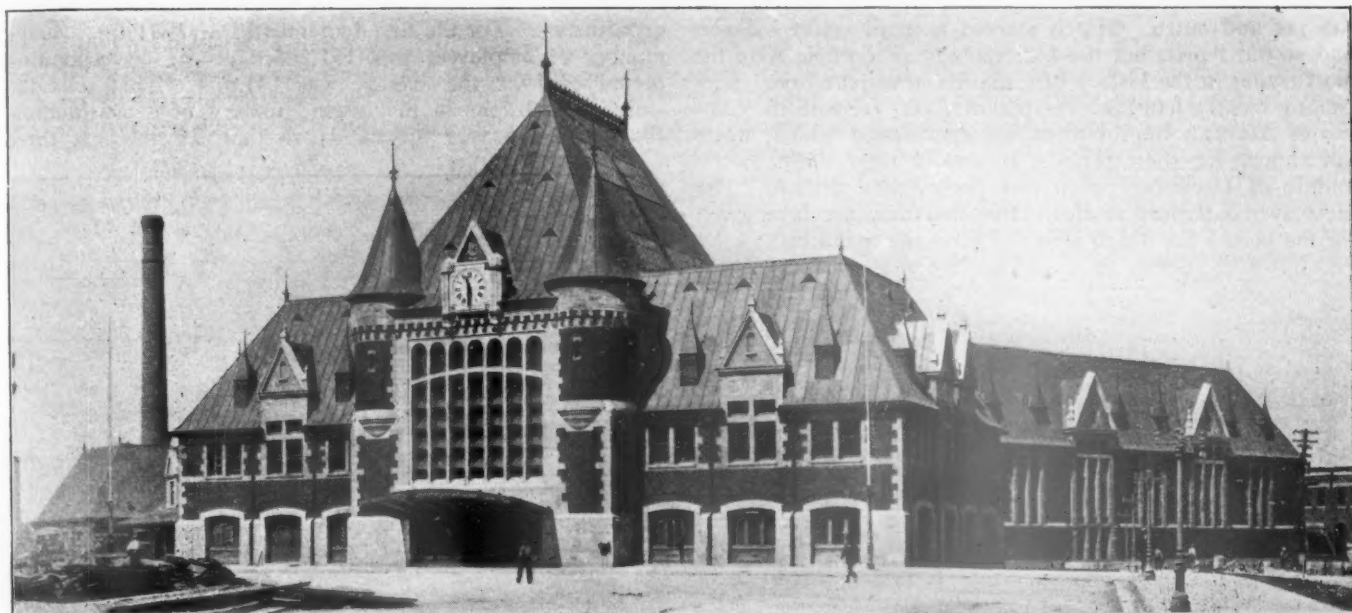
The northern division extends from Merida to the port of Progreso, 23 miles; the southern division to Peto, 96 miles; the western division to Campeche, 112 miles. There are other branch lines belonging to the system.

The Mexico Northwestern, which runs from Juarez to Chihuahua, 472 miles, suffered more from revolutionists and bandits during the war activities than any other railroad in Mexico of corresponding length. It is owned by Canadian and English interests. Much has been done during the last two years toward improving its physical condition.

It is again in regular operation, and shows a gratifying increase of traffic, it is stated.

The Mining Roads

Besides these several larger systems of railway there are a number of railroads in Mexico that were built primarily for the purpose of affording outlets for mining districts. All of these lines are independently operated. Among them are the Mexican Northern, which runs from Sierra Mojada to Escalon, 125 miles; the Coahuila & Zacatecas, which runs from Saltillo to Concepcion, 58 miles, with a branch line to Avalos, 17 miles; the Parral & Durango, which runs from Minas Nuevas to Parajeseco, 94 miles; the Mexican Union, which runs from Minas Prietas to Torres, 12 miles; the Mexican Mineral, which runs from Smelter No. 3 in Monterey to San Pedro, 20 miles; the Potosi & Rio Verde, which runs from Ahuacatl to San Luis Potosi, 38 miles; the Mapimi Railroad, which runs from Bermejillo to Mapimi, 15 miles; the Toluca & Tenango, which runs from Toluca to Atla, 19 miles; the Western Railway of Mexico, which runs from Culiacan to Altata, 38 miles, and the Tampico & Panuco, which runs from Tampico to Panuco, 30 miles.



Palais Station, Quebec

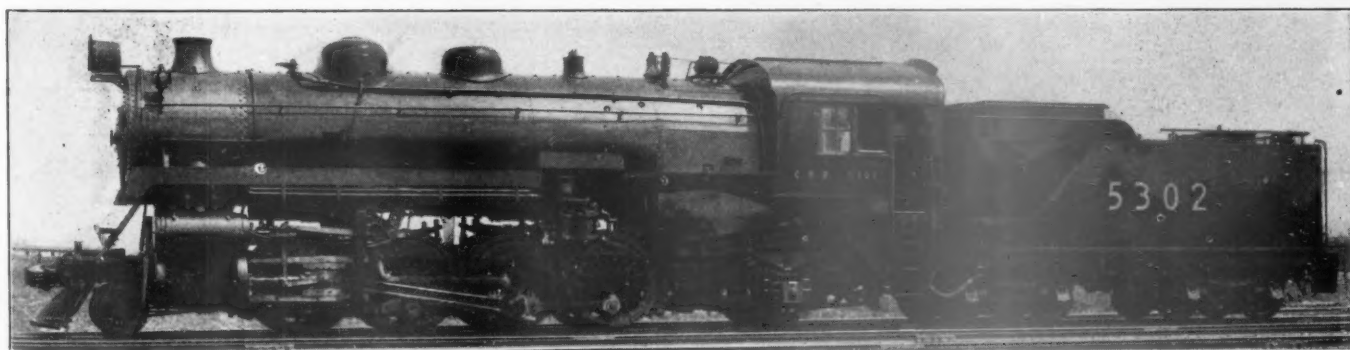
Canadian Roads Improve With Lower Gross

Greater Efficiency and Reduced Costs Bring Increased Net—Facilities Inadequate

By J. L. Payne

WHEN 1922 dawned the railways of Canada were in the grip of an experience for which they were unprepared. Nothing that had happened to them in the past had taught them how to meet a declining revenue with all the factors in operating expenses stationary. Yet that is precisely the problem by which they were confronted. From

for granted that mathematics could be ignored—that somehow the railways could make three go into five twice. They must have had some such idea in the back of their heads when they started the railways into 1922 under circumstances which forbade the giving of adequate service without loss. The plural is here used, since there has invariably been but



A Canadian Pacific Freight Locomotive

the closing months of 1920 they had seen a steady decrease in traffic. Rates had been cut in response to popular clamor, and a half-hearted effort had been made by the Railway Commission to deflate wages as a countervail; but the cost of labor and materials was still near the peak of war-time conditions. They entered the year, therefore, in a state bordering on despair.

Regulating bodies, it would seem, have often proceeded on the assumption that railway executives had some occult way of solving purely economic problems. In the adjustment of earning power to expenses they appear to have taken it

one policy at both Washington and Ottawa. For all practical purposes there might as well have been but a single board; and at both centers there was apparently the same disposition to ask the railways to attempt the impossible.

Conditions Improve After First Few Months

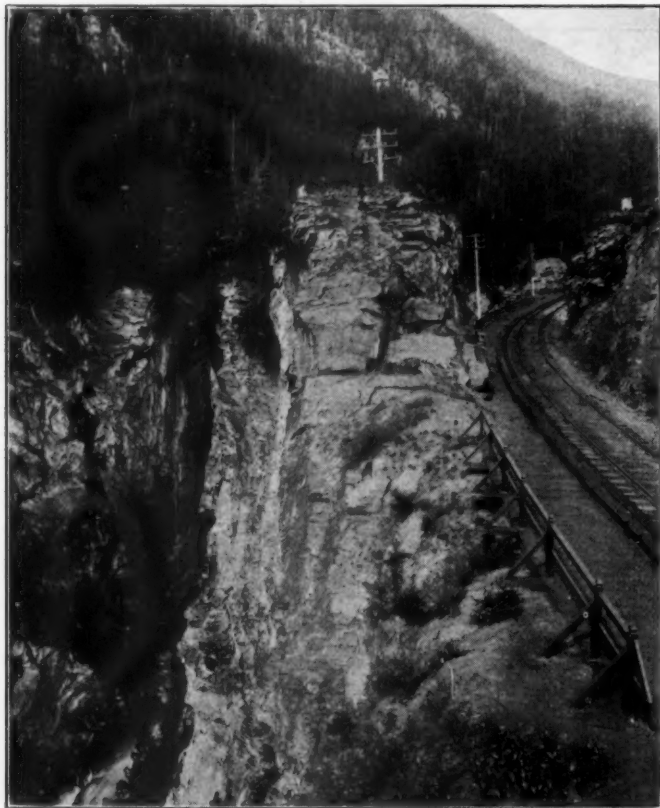
The first four months of 1922 brought many a grey hair to heads in the general offices; for there was acute discouragement. Each week that came saw operating results worse. Taking all the railways of Canada as a group, January and February produced a direct deficit as between

receipts and outgo. March showed a small credit balance, and so did April; but the four months as a whole were the most trying in the history of Canadian transportation. Succeeding months had their disappointments; yet with the coming of May an improvement was manifested which, while interrupted for short periods, continued right down to the middle of December, when this review was written. The facts by months are so instructive that they are here given for the period for which official figures are available:

	Gross revenues		Operating expenses	
	1922	1921	1922	1921
January	\$28,616,226	\$36,423,417	\$29,443,846	\$38,495,584
February	28,541,651	32,911,928	28,681,967	34,343,761
March	34,133,682	36,362,509	30,564,879	34,994,741
April	29,316,549	33,555,435	28,000,673	32,296,276
May	33,802,252	32,802,761	29,866,076	31,326,527
June	33,353,194	34,579,905	30,889,093	32,496,057
July	35,086,075	36,252,799	32,676,102	34,033,151
August	37,666,035	40,173,293	33,350,480	34,978,718
September	41,817,612	43,258,401	34,544,036	36,970,925
Total	\$302,333,276	\$326,320,448	\$278,017,152	\$309,935,740

Executive Skill Wins

There was but a single month—May—in which operating revenues exceeded the showing for 1921, and that better-



Albert Canyon, Canadian Rockies

ment was less than \$1,000,000. For the whole period there was an adverse difference of \$23,987,172. On the other hand, there was not a month in which operating expenses were not reduced below the record of the preceding year. It was therefore rigid retrenchment which won the battle. Executive skill triumphed over circumstances. While gross revenues fell off by 7.3 per cent, operating cost was cut by 10.3 per cent. The result was a net operating revenue for the nine months of \$24,316,124.

We have not far to seek for the main factor in this process of curtailing operating outgo. It is to be found in the payroll. The total of salaries and wages for the nine months period of 1921 was \$182,155,324. For 1922 the figures were \$165,902,410. During the first four months of the year there was a merciless cutting down of the staff in all

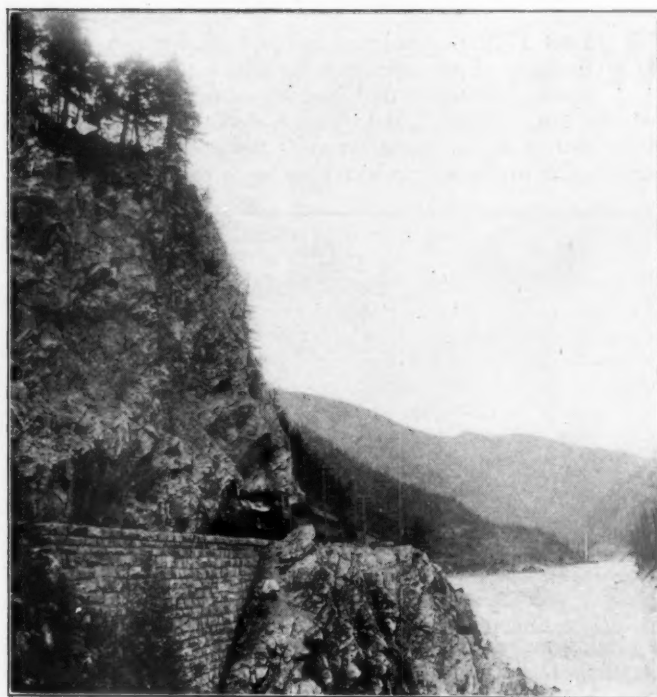
departments. For the first four months of 1921 the average number of employees was 151,205; for the corresponding period of 1922 the average was 141,679. That tells the story. Conditions in that regard underwent a considerable change as the year advanced; so that for the last three



Entrance to a Spiral Tunnel in the Canadian Rockies on the C. P. R.

months of the 1922 period under review the average reached 168,938, as compared with 163,958 for 1921.

An analysis of earnings from public service for the first four months of 1922 reveals the fact that freight receipts totalled \$88,066,252, as against \$99,292,427 for the corre-



Near Yale, B. C.

sponding part of 1921; while passenger earnings declined from \$26,945,502 to \$20,380,283. The loss in freight receipts was equal to 11.3 per cent, and in passenger receipts to 24.4. This shrinkage in passenger business was one of the salient features of the year, and puzzled the executive heads not a little. There was a revival in both earning

divisions as the months proceeded, and by the end of September the comparative loss in freight was but 4.6 per cent, and on the passenger side 15.4 per cent.

Lower Rates and More Low Rated Traffic

Nevertheless, for the whole period of nine months there was a small gain in both tons hauled and ton-miles. The explanation of the loss is therefore to be found in two

years the long haul from the West, during the pressure of wheat going out for export, invariably causes a certain degree of inconvenience; but this year the need for a larger supply of equipment was aggravated by the fact that since 1914 the railways have not been making purchases in keeping with additions to operating mileage. As a natural result, there are in Canada fewer cars and locomotives per 1,000 miles of line than there were eight years ago. Anyone who



C. P. R. Station at Lake Louise, Alta.

things—lower rates, and a larger volume of low-grade freight. The effect of a reduced tariff is obvious from every angle. The influence on gross earnings of commodity movement was, however, more pronounced after September than before. During the three months ended November there was an unprecedented proportion of grain and coal, and, apart from the general scale, the enforcement of the Crow's

assumes that such a condition was produced by a deliberate policy on the part of the railways has not been keeping himself informed. The sole reason why more new equipment was not bought is that which dictates the scales of buying by individuals. The railways were too poor. They had not the money, and could not get it. To make matters worse, in the autumn of 1922, the revival of traffic began on the



Where the Canadian Pacific Follows the Fraser River at Yale, B. C.

Nest Pass agreement of 1897 by the now influential Progressives in Parliament had a marked effect on receipts from western wheat shipments.

Canada Too Has Car Shortage

Co-incident with the heavy traffic movement of the autumn months there was a considerable shortage of cars. In normal

American side earlier than in Canada, and many Canadian cars were held across the border.

For the whole year, it looks at this moment as if gross earnings would fall about \$15,000,000 below the total for 1921, and that loss is much more than accounted for by the cut in rates. To the end of September the decrease, as compared with 1921, amounted to \$23,987,172; but while that

was happening operating expenses were reduced by \$31,918,-588. There will therefore be a gain in net for 1922—not a substantial but still an encouraging gain. October and November were big business months; but, for the reasons given in a preceding paragraph, they will not materially add to net earnings. In fact, there are good reasons for believing that traffic of that nature is being hauled at a loss under existing conditions. The farmer may fancy that rates on the produce he has to ship are high—and they are unquestionably high when compared with rates prior to 1918—but there is very clearly the railway side of the matter to be considered. Moreover, unless the accepted doctrine with respect to transportation charges, viewed as a tax, are to be set aside, the individual who really foots the bill is the ultimate consumer. In other words, fluctuations in freight charges do not seriously affect the price which the farmer receives.

Sir Henry Thornton and the Canadian National

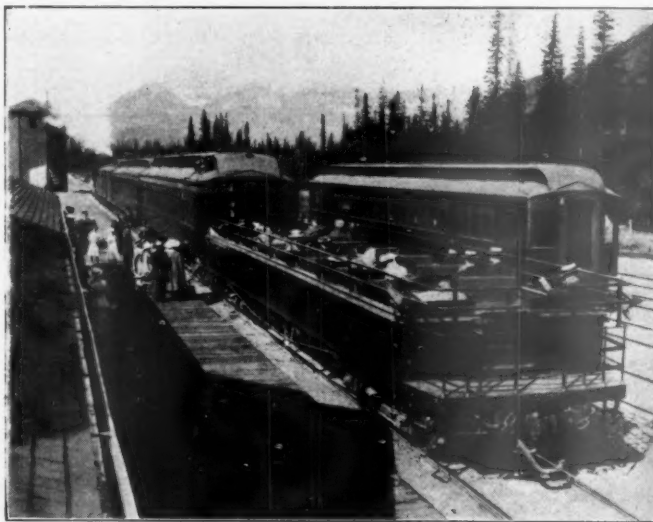
From the public point of view, the main event of the year in the railway realm was the handing over of the Canadian National group to a board of management, with Sir Henry Thornton as president. In that very incident, however, ground is afforded for a telling comment on the weakness of public ownership. The statute creating the Canadian National, and providing for a board, was passed early in 1919; yet until near the end of 1922 the board of the old Canadian Northern was permitted to administer the entire government system. In the meantime, matters had gone from bad to worse. In 1917, the year before the Canadian Northern and Grand Trunk Pacific were taken over and linked up with the old Intercolonial, the deficit was merely nominal. By the end of 1921 it had become appalling. And this occurred co-incidentally with drafts on the Dominion treasury exceeding \$600,000,000. Yet drifting continued for nearly four years, with rising deficits. It should not occasion surprise, therefore, that the people of Canada, who are at all times responsible for liabilities, had reached a state of most acute alarm.

There has been considerable jubilation during recent months among the advocates of public ownership in Canada over the announcement made by Sir Henry Thornton at Montreal, that the Canadian National would probably end the year without an operating deficit. This would imply a betterment of about \$16,000,000, as compared with the result for 1921. But that is only half the story, unfortunately. While operating outgo has been approaching a balance with operating income, fixed charges have been rising on an equal scale; so that one account neutralizes the other. The public treasury is not helped a particle. The popular burden remains as heavy as ever. For example, it was the good showing of the Grand Trunk which pulled the other units out of the hole for the year; but while that road was improving its net operating revenues it had additional fixed charges fastened on it, arising out of government advances exceeding \$200,000,000. In other words, for every dollar that it

gained on the operating side there was added four dollars or more on the side of permanent charges against revenues.

Difficult Task of C. N. R. Management

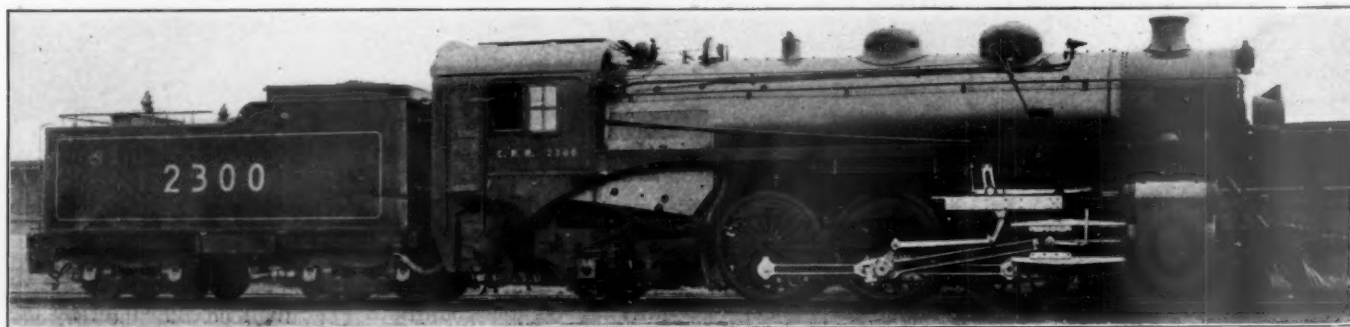
That is the very essence of the public ownership situation in Canada at this moment. There seems to have been a determined effort to eliminate the operating deficit; and that effort will probably be successful for 1922. But there is no actual betterment. The fixed charges stand at about \$100,000,000, according to standard accounting—but which has not yet been given effect on Canada's publicly owned railways as a whole—and that is the mountain which Sir Henry Thornton and his associates are expected to remove. The outpouring of capital from the public treasury shows no sign of diminishing, and the policy of stimulating immigration recently announced by government will inevitably carry



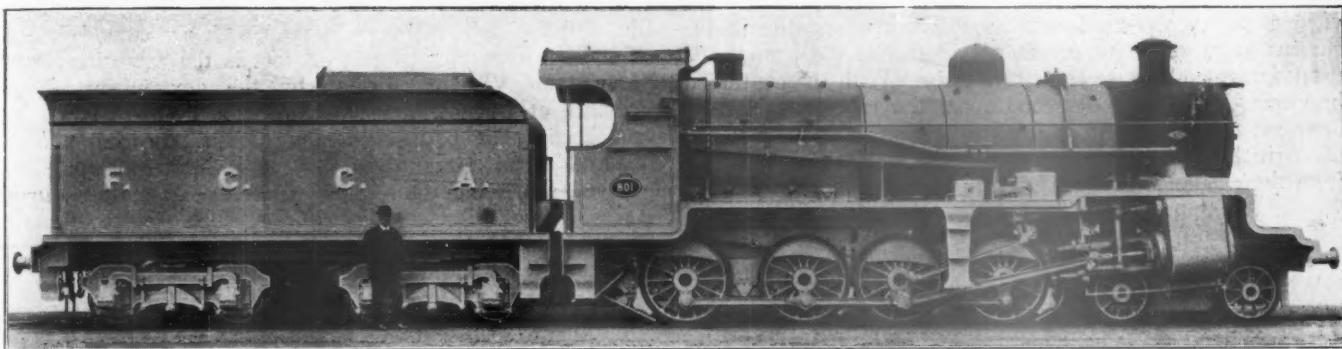
Open Observation Car in Canadian Rockies

with it considerable railway extension in the Western provinces. Since public ownership began, the volume of fixed charges has been swollen by more than \$40,000,000, and on the whole sum the deadly compounding principle threatens to consume all that may be gained by improvement on the operating side.

The Canadian people have been greatly heartened by Sir Henry Thornton's courageous utterances with respect to the elimination of political interference, and they will be cheerfully disposed to give him all the co-operation of which they are capable, in the giving of which they will, of course, have a clear appreciation of the burden that now rests upon themselves. Their faith is centered on the new president, and they are earnestly praying that he may win out in the inevitable battle with the politicians. Can some of them be blamed if, looking back over a bitter past, they have more anxiety on that score than confidence?



A Canadian Pacific Passenger Locomotive



A Freight Locomotive on the Central Argentine

Argentina Looks to New Year With Hope

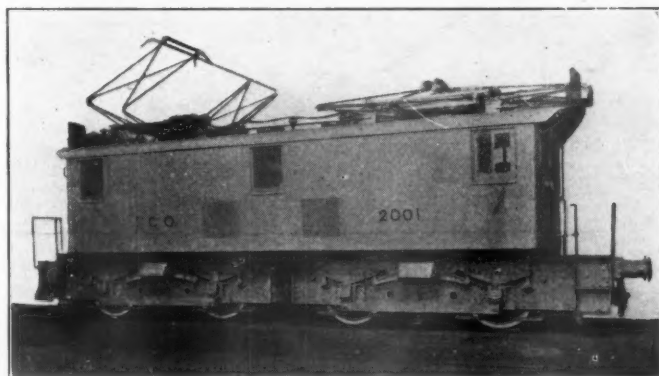
Year Marked by Depression With Government Lines
Only Ones Showing Much Activity

By M. Michelin

ARGENTINA has experienced a severe depression in business during the past year, which has affected the railroads adversely, since they have not been able to make corresponding reductions in operating expenses. Indeed, wages have been advanced and the railways have been required by law to provide for the pensioning of superannuated employees.

The Rate Controversy

Most of the foreign-owned railways in Argentina are British and some of these lines have been in a critical con-



A Baldwin-Westinghouse Locomotive for the Buenos Aires Western

dition during the past year, particularly the North Eastern and the Entre Rios, which companies at one time had exhausted all their deposits and credits in local banks and were on the verge of bankruptcy. Naturally, the railways sought a remedy for their troubles in increasing rates, but here they encountered a decided opposition on the part of public opinion, particularly among the agriculturists, which opposition was reflected by the government. The government neglected to approve applications for increased rates for many months, and the railways, unable to wait longer, increased the rates without the sanction of the government.

The government immediately demanded that the companies restore their former rates, and most of the railways

obeyed. A few of them refused and were forced to pay heavy fines, and in the end they too were forced to restore the lower rates. Thereafter, applications for increases were presented to the government in due form, which delegated the General Direction of Railways (Direccion General de Ferrocarriles), a newly created body, which eventually permitted certain increases to be made. Live stock rates and those on season passenger tickets were not raised.

No Wage Reductions

There have been no wage reductions and the railways have not sought to bring them about, which action places the Argentine railways in a class almost by themselves among the railways of the world. The failure to bring about wage reductions resulted from the attitude of the government and from a fear that there might be some trouble with the organized employees if reductions were made. As a result, the labor situation has been fairly satisfactory without any important strikes taking place. There was a small strike of the kind known as "des bras croisés," i.e., "loafing on the job," on the Central Argentine, which strike was, however, quickly settled.

Of all roads, the Central Argentine is, perhaps, in the strongest financial position. It was able to pay a 4 per cent dividend out of earnings for the fiscal year 1921-22. This company was not involved in the conflict with the government over increased rates and consequently was granted the permission to increase its rates before the other companies. Operating revenues of the railways have been very low during the year with a few exceptions, among which are the Central Argentine, the Central Cordoba and a few secondary lines in the South.

Dubious Attitude on Part of British Capitalists

The poor earnings and the somewhat unfriendly relations of the government have resulted in a rather dubious attitude on the part of British capitalists as to the advisability of investing any more money in the Argentine railways. As a consequence, there has been little activity in the way of extension or improvement of any kind on the privately owned railways of the country. The dividends of the British-owned railways, paid largely out of surplus, appear, however, to be fairly satisfactory, and the British owners, in

view of the prospects for satisfactory earnings during the current fiscal year, are not as pessimistic as the past year's results might otherwise lead them to be. With the continued improvement of business conditions, the rate of exchange, however, must be taken into consideration. Two years ago the British owners gained large profits in their remittances from the exchange factor alone, but at present they suffer a loss in remittances from Argentina.

Government Railways Active

While new construction has been at a standstill on the privately-owned lines, the government-owned railways, on the other hand, have seen a year of vigorous improvement and expansion. The government, headed by President Irigoyen (the plans of the new president, Alvear, are not yet known) has purchased several secondary lines, has bought much new equipment and has started the construction of the new transandine railway in the North, which latter project was described in the *Railway Age* of December 30, page 1237. The government has also built a new system of light railways in the South.

Little has been done in the way of electrification in Argentina, although there are some electrified suburban lines around Buenos Aires. There is a project on foot for the electrification of the suburban lines of the Western Railway and of the Transandine, but generally speaking, electrification in Argentina is not very far advanced.

The Fuel Question

The question of fuel is an important one in Argentina, since there is no coal. A number of oil fields are being developed and the use of fuel oil is rapidly replacing wood on a number of lines, but here, too, the State Railways have shown the greater progress, primarily because a great part of the oil properties are controlled by the state. There is great activity in the petroleum industry and without doubt the use of fuel oil will increase greatly in the near future.

The bulk of the purchases of rolling stock and supplies during the year has been made by the State Railways. They will doubtless make more purchases as the new transandine

line and the light railways in the South are extended. Another very important project on foot is the extension of the "Meridiano V" line, owned by the government of the Province of Buenos Aires. Competition in this market has been keen. The British lines, of course, buy most of their material from Great Britain. American concerns have received some important orders from the state lines during the past year, but their German competitors are continually decreasing their prices.

Bright Prospects for Future

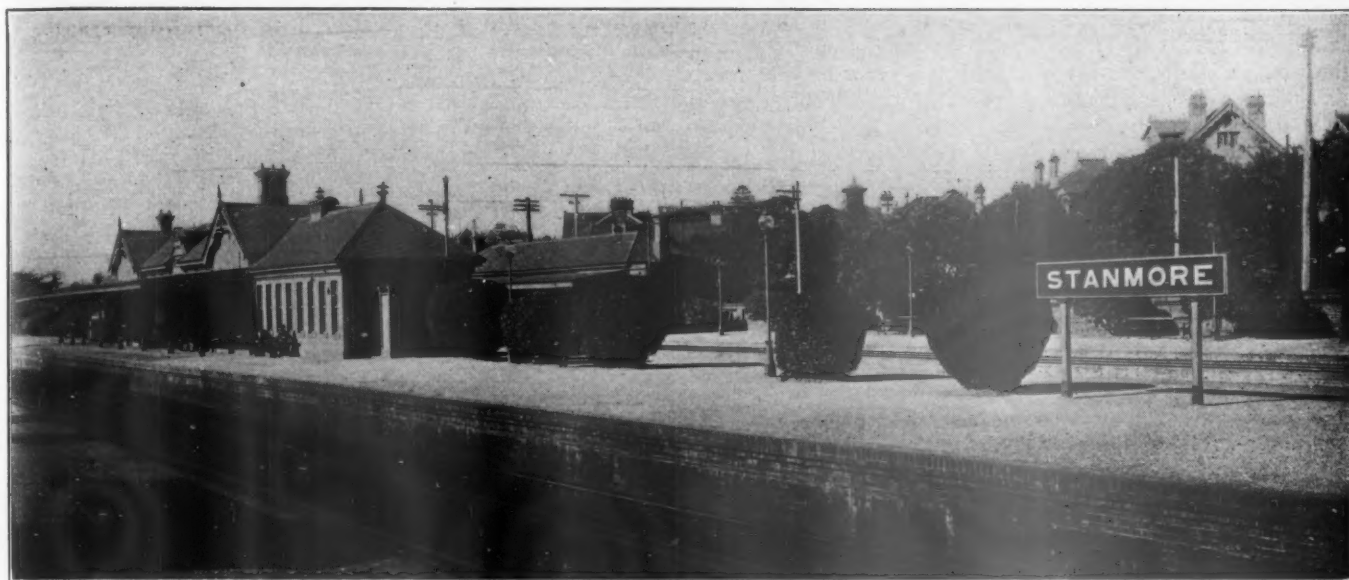
During the coming year, the financial condition of the Argentine railways will doubtless improve considerably. Prospects are excellent, particularly in the agricultural regions (the provinces of Sante Fe, Entre Rios, Cordoba, Buenos Aires and Pampa). The cereal crop, which is harvested in December and January, promises to be one of the largest the country has ever seen, and for several months the lines will be kept busy carrying the crop. Cattle business is improving and there is a brisk demand for Argentina wool and hides. Very likely, too, the period of discord between the Argentine government and foreign-owned interests is closed definitely. The new president, Alvear, has clearly stated that he will seek the co-operation of foreign capital.

Desirable Field for Investment of American Capital

Argentina offers a most desirable field for the investment of American capital, a fact which is becoming more and more recognized. Frank C. Munson, president of the Munson line, in an address delivered recently before the American Club at Buenos Aires, said, "There is no place more worthy of investment by our capitalists than Argentina. There is no reason why American capital should not be invested here. You have good, stable government, exceedingly good promise in your fertile lands and good staple industries, and it would be wholly advantageous to both people to have American capitalists turn their thoughts towards Argentina. There is a good outlet here for American brains and an open door for American capital, intelligence and initiative."



Express Passenger Train on Hungarian State Railways



A Typical Australian Suburban Station With Car-Floor-Level Platforms

Australia Turning to American Practice

Railways Seek to Increase Clearances and Size of Equipment—Face Gage Problem

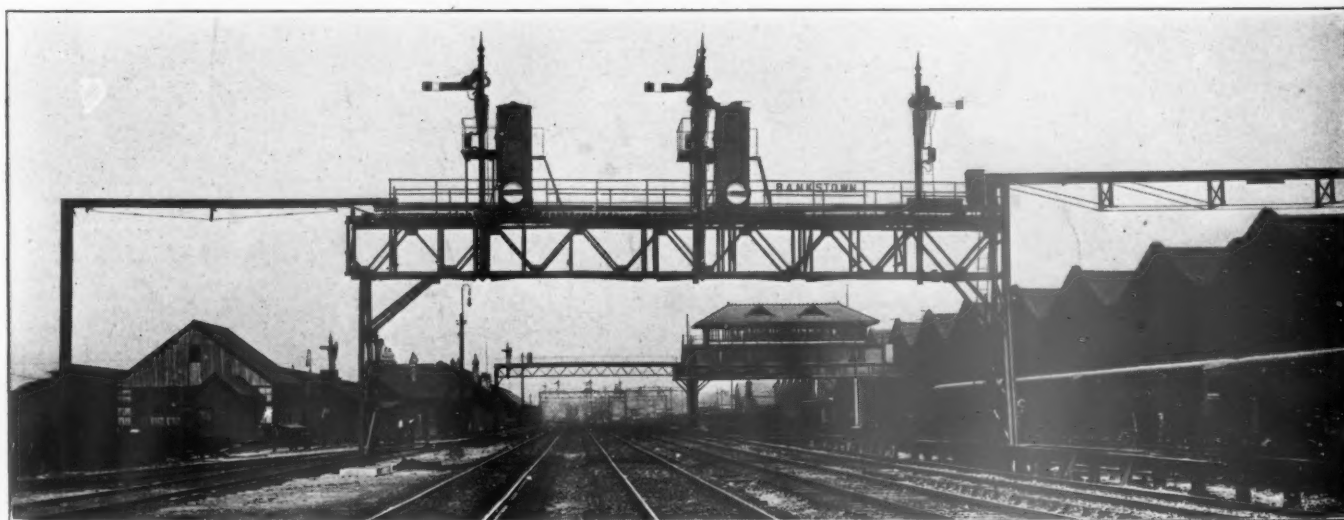
By W. H. Newman

SYDNEY

SOME knowledge of the general physical conditions of the country itself is an essential to a proper understanding of Australian railway conditions and problems. The Australian Commonwealth comprises the island continent of

whole of the British Empire, and more than 25 times as large as the British Isles.

The coast line of the continent measures approximately 12,000 miles. The northeast, east and southeast portions



On the N. S. W. Government Railways

Australia proper and the comparatively small island of Tasmania, 200 miles distant off the mainland. Situated as it is in the southern hemisphere, Australia lies at the other end of the world, being 10,000 miles from Great Britain, and 6,000 miles from the United States of America. Its area is greater than that of the United States; four-fifths of the area of Canada; nearly one-quarter of the area of the

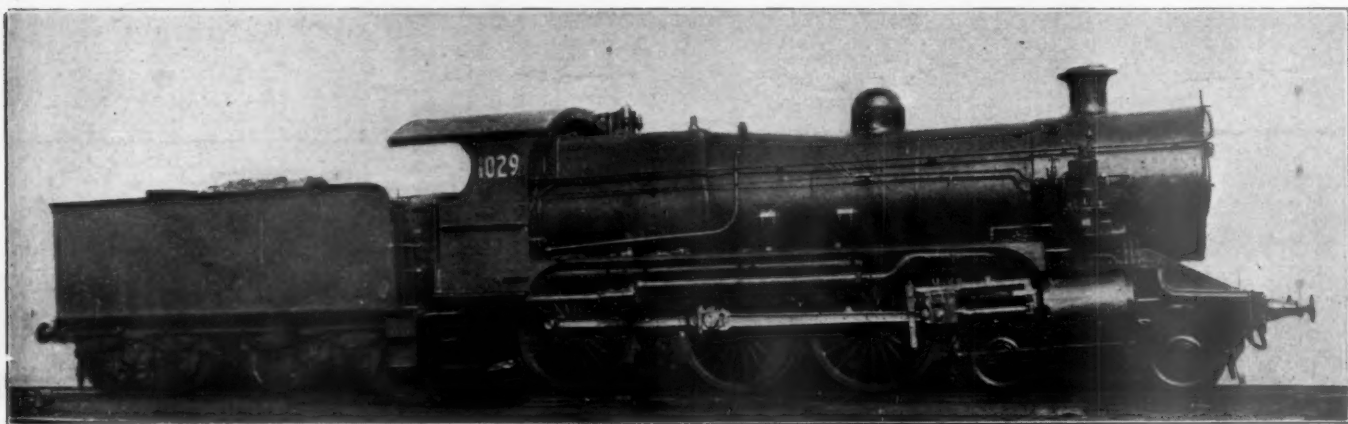
are fringed by a range of hills, or low mountains, 50 to 100 miles inland, and rising up to 4,000 ft., which are the bulwarks of the vast undulating tablelands behind. Then come the vast plains, broken by occasional hills and ranges of low mountains, which lead into the extensive and undeveloped interior, and extend for thousands of miles to the west coast where they are met in the south by several interrupted

ranges of small mountains. It is in the coastal and table-land regions that the majority of the population is settled, the vast plains, where practicable, being given over to sheep rearing, which, as the climate becomes more tropical, gives way to cattle rearing.

The rainfall of the Continent is largely determined by

tralian railways in comparison with the railway systems of other countries.

In the eastern, southeastern and southern parts of Australia there now exist several individual networks of railway lines, all converging from the various agricultural, pastoral and mining districts, towards the principal ports, which are



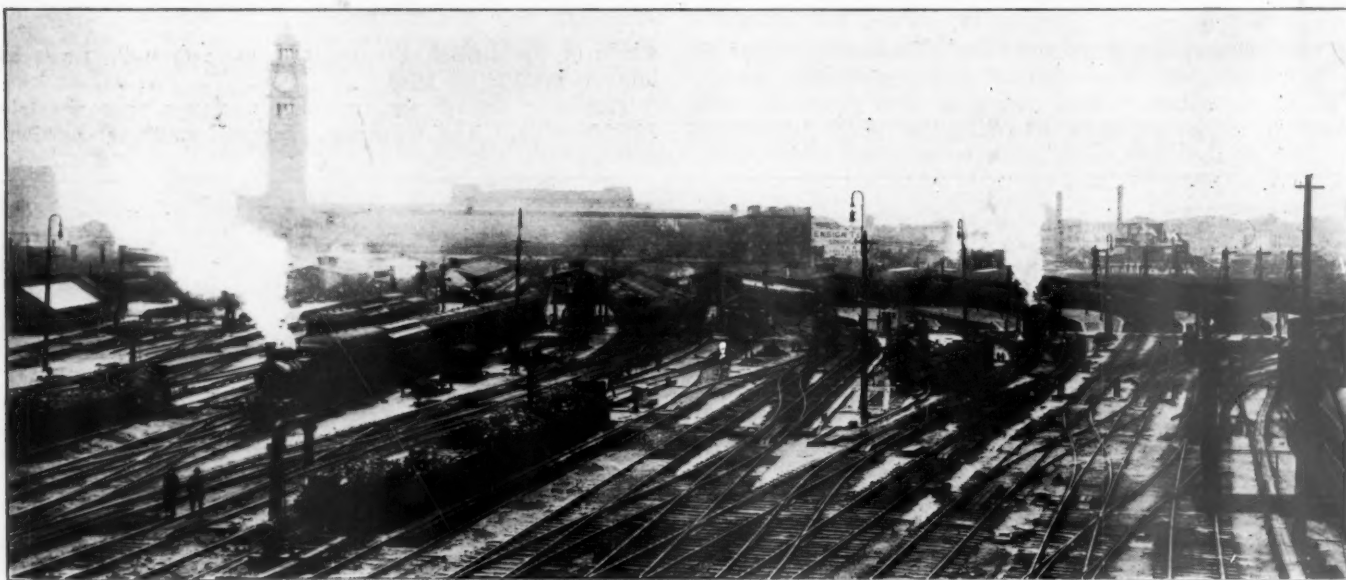
An Australian Passenger Locomotive

Standard Gage—Cylinders, 22½ in. by 26 in.—Diameter of Driving Wheels, 69 in.—Boiler, Inside Diameter, 65½ in.; Pressure, 180 lb.; Tractive Effort, 29,200 lb.—Tender Capacity, 10½ Tons of Coal and 4,800 Gal. of Water.

location, ranging from 5 in. to nearly 200 in., and this rainfall is the great factor which determines the primary industries. The climate also is of great variety, ranging from tropical, semi-tropical to temperate, being as hot as any equatorial district in the north, and having the cool temperate climate of England in Tasmania. Australia has been

themselves connected by systems of lines running approximately parallel to the coast. The total route mileage of Australian railways is approximately 25,000 miles.

In the state of West Australia there is a connected system of main or trunk lines between the ports of the state and the interior, while there are also two short lines, one on the



Central Station, Sydney, New South Wales

This Station Handles 820 Trains a Day. It Has 19 Platforms and a Maximum Capacity of 113 Trains an Hour

aply described as a land of rich soil, wonderful opportunities and glorious sunshine.

Bearing of Geography on Railway Problem

Such in brief is the Australian Commonwealth, with a population of 5½ millions of people, or only 1.84 for every square mile of land. These two factors—huge area and small population—make the problems of Australian development unique in character. They must be properly understood by all who would appreciate the position of the Aus-

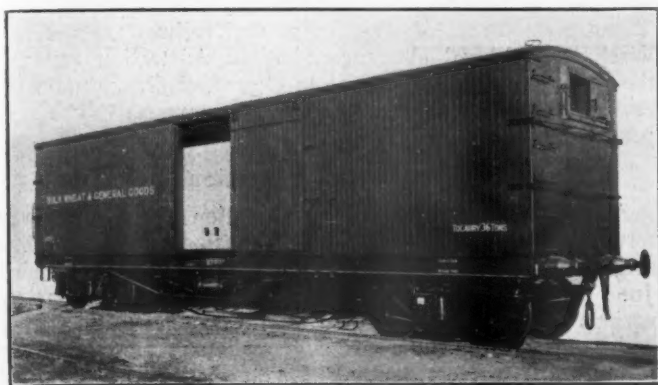
northwest, the other on the south coast, which are unconnected with the main system. In the northern parts of Queensland, and in the Northern Territory, there are also several disconnected lines running inland from the more important ports. In Tasmania the principal towns are connected by a system of lines, and there are also, more especially in the western districts, several lines which have been constructed for the purpose of opening up mining districts.

With a few minor exceptions, all the railway lines in the Commonwealth open for general traffic are now owned and

managed by the respective states in whose territory they run, or by the Commonwealth. Unfortunately, however, for the purpose of interstate traffic, the construction of the various systems in different parts of Australia has proceeded without uniformity of gage.

Mileage of Line

The railway system of New South Wales comprises a route mileage of 5,116 miles, all standard gage (4 ft. 8½ in.). In Queensland the gage is 3 ft. 6 in., and the total



An Australian Wheat Car

Weight, 21 Tons; Capacity, 40 Tons; Length Over Body, 40 ft. 3 in.; Outside Height, 8 ft. 9 in.; Standard Gage

mileage open for traffic is 5,769 miles. Victoria has a route mileage of 4,317 and a gage of 5 ft. 3 in. South Australia has 1,210 miles of 3 ft. 6 in. gage track, and 1,148 miles of 5 ft. 3 in. gage. The gage of West Australia is 3 ft. 6 in., and 3,539 miles are open for traffic. The mileage of line in Tasmania is 630, and the gage is 3 ft. 6 in. The federal government operates the Trans-Continental Railway between Kalgoorlie in West Australia and Port Augusta in South Australia, a distance of 1,052 miles, gage 4 ft. 8½ in.



Interior of First Class Main Line Passenger Car in Australia

A short length of 4 ft. 8½ in. railway owned by the federal government runs from Queanbeyan, New South Wales, to Canberra (federal territory), a distance of 5 miles. One hundred and ninety-nine miles of 3 ft. 6 in. gage railway is in the northern territory, and this line is also owned and operated by the federal government, while 178 miles of 3 ft. 6 in. gage railway from Port Augusta to Oodnadatta in South Australia, is owned by the federal government but operated by the South Australian Railway Department.

The development of the railway systems of the Commonwealth has shown that the adoption of different gages on the main lines in the several states was a serious error. The extra cost, delay and inconvenience incurred by the necessity of transferring through passengers and freight at places where there are breaks of gage are becoming more serious as the volume of business increases. Recently a Royal Commission was appointed by the federal government to report on the question of unification of gage, and this commission recommended that the 4 ft. 8½ in. gage be adopted as standard. The estimate of the cost of converting all lines except those in Tasmania to standard gage is \$285,000,000. The federal government has adopted the report and recommendation of this royal commission, and is now about to proceed with the unification of the main trunk lines of the Commonwealth.

Problem of Clearances

Allied to the question of the gages is that of the rolling stock gages which are in use, the rolling stock gage being the maximum transverse dimensions to which rolling stock



Reinforced Concrete Signal "Box," New South Wales Government Railways

may be constructed to clear obstructions along the line. In the following table will be found particulars of the rolling stock gages, together with the maximum lengths and weights of cars at present in use on the government railways, both state and federal.

Railway	PASSENGER CARS						
	Maximum rolling stock gage						
	Gage of track	Width		Height above rail level		Length over-all	Maximum Tare Lb.
		Ft.	In.	Ft.	In.		
New South Wales.....	4 8½	10	6	14	0	74 4½	98,812
Victoria	5 3	10	0	14	2	74 1¼	107,072
Queensland	3 6	9	4	12	9	55 5	60,144
South Australia	5 3	10	4½	14	1¾	74 1¼	90,832
South Australia.....	3 6	9	4¾	12	1	62 6	55,776
West Australia	3 6	8	10	12	7	61 9	70,560
Tasmania	3 6	9	6	12	5	64 0	67,200
Trans-Continental	4 8½	10	6	14	6	74 11½	107,520

Railway	FREIGHT CARS						
	Maximum rolling stock gage						
	Gage of track	Width		Height above rail		Length over-all	Maximum Tare Lb.
		Ft.	In.	Ft.	In.		
New South Wales.....	4 8½	9	8	13	6	60 11	46,000
Victoria	5 3	9	7½	13	7¾	55 4½	46,284
Queensland	3 6	8	9	12	0	45 5	33,152
South Australia.....	5 3	10	0¼	12	10¾	43 6	35,840
South Australia.....	3 6	8	6	12	1	38 9	26,320
West Australia.....	3 6	8	8	12	6	44 9	39,996
Tasmania	3 6	8	6	11	0	40 10	27,440
Trans-Continental	4 8½	10	6	14	6	47 6½	33,600

In these tables the transverse dimensions given are not necessarily those of one particular car, but are the greatest employed on any.

It will be observed that the dimensions adopted by the federal government for the Trans-Australian Railway are in excess of those at present in use on the 5 ft. 3 in. gage lines of Victoria and South Australia, and the 4 ft. 8½ in. gage lines of New South Wales. It is, however, the intention of the latter state to adopt the federal standard as soon as possible, and with that end in view a commencement has been made in the Sydney suburban area in the enlargement of bridges, tunnels, buildings and platforms, to enable the larger rolling stock to be employed. The question of standard couplings on the New South Wales lines is also receiving attention.

Private Railways

A number of small private railway lines have from time to time been constructed in the Commonwealth. By far the greater portion of such lines, however, has been laid down for the purpose of hauling timber, sugar cane, coal, or other minerals, and is not generally used for the conveyance of passengers or for public traffic. In many cases the lines are often practically unballasted, and are easily removable, running through bush and forest country in connection with timber and sugar milling industries, and for conveying firewood for mining purposes. Many of these lines may perhaps be said to be rather of the nature of tramways than railways.

Heavy Equipment

The development of the rolling stock of all classes on the Australian railways, particularly the systems of New South Wales and Victoria, is reasonably in harmony with that

which has taken place in the greater countries of the world. Though they have not kept pace with the United States of America in respect of the size or hauling capacity, their progress compares favorably with that of Great Britain or Europe, even though the business done is only fractional of that handled even by the former.

The fact that the progress in rolling stock has not been equal to that of the United States of America is not so much due to lack of desire to introduce locomotives of very great hauling capacity, as to the very heavy expenditure which must be incurred to permit of the use of such locomotives. The United States of America started railway construction wisely with liberal clearances, but on Australian railways the British practice in regard to clearances was introduced, and has been maintained up to a comparatively recent period.

Summary of Operations

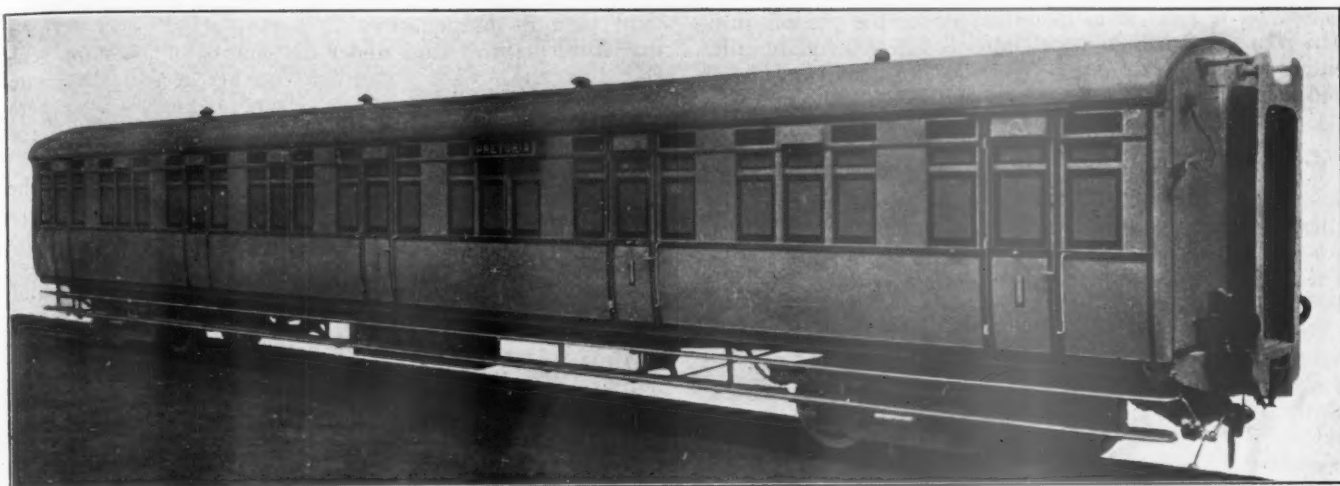
Always the most essential information about a railway service is a clear statement of the business it does. The accompanying summary of operations during the year ended June 30, 1922, will show at a glance the work done by various railways of the Australian Commonwealth, all of which are government owned and operated.

In regard to New South Wales, it should also be stated that a very big tramway (street car) system is also controlled by the railway commissioners. A total of \$47,728,600 of public money is invested in these tramways, which earned \$18,050,675 last financial year, and returned a profit of \$2,972,595 equal to 6.4 per cent on the capital invested.

OPERATING STATISTICS, FISCAL YEAR ENDED JUNE 30, 1922*

	New South Wales	Victoria	Queensland	S. Australia	W. Australia
General:					
Area in square miles.....	309,432	87,884	670,500	380,070	975,920
Population.....	2,137,135	1,563,688	785,449	505,069	335,927
Miles of railway open for traffic.....	5,116	4,317	5,799	2,357	3,539
Total capital cost.....	\$416,642,481	\$306,621,988	\$217,946,725	\$97,997,271	\$92,216,386
Capital cost per mile of line.....	\$81,436	\$71,328	\$37,581	\$41,784	\$26,059
Population per miles of line.....	418	362	135	215	95
Financial Results:					
Total earnings.....	\$74,087,402	\$52,552,693	\$25,102,561	\$16,058,956	\$13,772,535
Operating expenses.....	\$54,137,267	\$39,090,735	\$23,427,339	\$12,356,602	\$11,342,342
Net earnings.....	\$19,951,888	\$13,463,587	\$1,676,974	\$3,703,230	\$2,431,069
Percentage return on capital.....	4.88%	4.35%	.76%	3.79%	2.64%
Percentage of operating expenses to earnings.....	73.07%	74.38%	93.32%	76.94%	82.35%
Earnings per average mile open.....	\$15,467	\$13,158	\$5,215	\$7,723	\$4,767
Operating expenses per average mile open.....	\$11,537	\$10,012	\$4,928	\$6,145	\$4,081
Net return per average mile open.....	\$4,806	\$4,022	\$1,163	\$2,454	\$1,563
Earnings per train mile.....	\$3.37	\$3.17	\$2.58	\$2.82	\$3.01
Operating expenses per train mile.....	\$2.46	\$2.44	\$2.42	\$2.18	\$2.44
Net return per train mile.....	\$0.91	\$0.85	\$0.16	\$0.65	\$0.55
Staff:					
Total number of employees.....	36,832	26,961	.....	7,972	7,505
Average rate of pay per annum.....	\$1,222	\$1,212	.....	\$1,090	\$1,134
Passenger Traffic:					
Number of passengers carried.....	121,298,861	142,456,924	27,155,606	23,316,141	17,895,509
Number of passengers carried one mile.....	1,610,618,950	1,231,827,597	.....	262,557,750	.....
Passenger earnings.....	\$28,902,456	\$23,449,050	\$7,538,482	\$5,135,210	\$4,082,550
Passenger earnings per mile of line.....	\$5,693	\$5,478	\$1,305	\$2,191	\$1,154
Total passenger train receipts.....	\$32,319,896	\$26,184,227	\$9,978,936	\$6,040,611	\$4,739,342
Passenger train receipts per mile of line.....	\$6,365	\$6,121	\$1,723	\$2,576	\$1,154
Passenger train receipts per train mile.....	\$2.83	\$2.64	\$2.69	\$2.18	\$2.50
Freight Traffic:					
Tonnage of freight hauled.....	15,900,640	8,389,920	4,331,712	3,166,912	2,853,984
Tonnage of freight hauled one mile.....	1,529,876,260	767,073,843	.....	318,381,490	233,348,763
Ton-miles per mile of line.....	301,328	179,264	.....	135,798	65,936
Average carload—tons.....	10.57	9.74	.....	6.37	.....
Average length of haul—miles.....	96.21	91.43	.....	100.53	81.76
Freight earnings.....	\$38,735,541	\$23,449,322	\$15,911,697	\$9,743,486	\$8,222,907
Freight earnings per mile of line.....	\$7,631	\$5,478	\$4,485	\$4,154	\$2,322
Freight earnings per ton-mile.....	\$0.0276	\$0.0338	.....	\$0.0336	\$0.0390
Freight earnings per train mile.....	\$3.58	\$3.90	\$2.38	\$3.35	\$3.03
Train Mileage:					
Passenger train mileage.....	10,820,118	8,605,721	.....	2,523,476	1,523,989
Mixed train mileage.....	1,676,143	2,518,987	.....	565,268	1,055,645
Freight train mileage.....	9,390,804	4,732,107	.....	2,501,048	1,984,997
Total train mileage.....	21,887,065	15,856,815	9,634,532	5,589,792	4,564,631
Rolling Stock:					
Locomotives.....	1,321	768	680	493	423
Passenger train cars.....	2,194	2,475	884	677	609
Freight cars.....	21,473	18,928	14,580	9,081	9,952
Company service cars.....	1,846	696	423	448	.....

*EDITOR'S NOTE—Our correspondent used English weights and money in this table, but these have been converted for the benefit of the American reader to United States standards. In this conversion the pound sterling was taken as \$4.87, the shilling at 24¼ cents and the penny at 2 cents. Long tons (2,240 lb.) have been converted to short tons (2,000 lb.).



All-Steel First Class Suburban Car on the South African Railways

Extensive Development Planned in South Africa*

With Return of Sounder Economic Conditions Program of Improvement Is Again Resumed

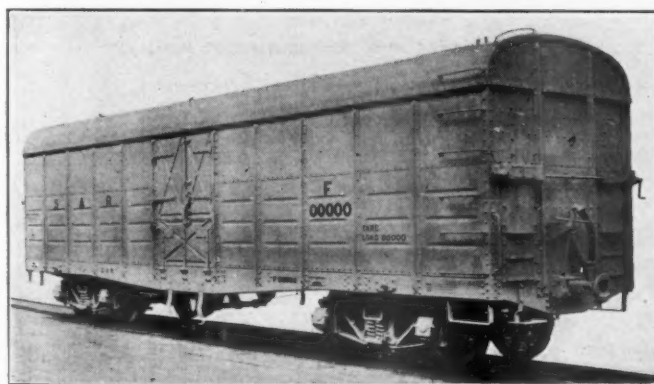
By Gilbert E. Chittenden

IN COMMON with other countries the Union of South Africa has had to face the critical phases of the post-war period, though hardly to the same extent as countries which were involved in the struggle on a larger and more intimate scale. Any current analysis of the railway position in South

all-important factor. It is an extensive and at present sparsely populated country almost entirely dependent upon rail communication for the maintenance and development of its trade, commerce, industries and wider social existence.

The Union today comprises the four provinces of the Cape of Good Hope, Natal, Transvaal and Orange Free State, a combined area of 473,000 square miles, or roughly that of the states of Texas, Louisiana, Mississippi, Arkansas and Oklahoma combined. The unification of the four provinces

JOHANNESBURG.



An 80,000-lb. "Grain Wagon"

Africa, however, must be based upon due consideration of the effects of the war, but more particularly upon certain developments accruing from the large amalgamation of South African railway interests which took place only about three years before the outbreak of hostilities.

When the war began the South African Railways Administration as a centralized concern was still in process of formation and the pre-war years, from the middle of 1910 to August, 1914, mark the only period of normal railway development under unified control. The general rate of progress, however, has been satisfactory, and in many respects remarkable.

In the Union of South Africa transport facilities are an



A Typical Country Station on the S. A. R.

and their railway systems came about on May 31, 1910, according to the terms of the South Africa Act of 1909. Following upon the Peace Treaty concluded at Versailles on June 28, 1919, a mandate was issued to the Union government in respect of the adjoining territory of South West Africa (322,000 square miles, or slightly less than the combined area of Illinois, Iowa, Missouri, Nebraska and Kansas), which is now administered and controlled by the

*EDITOR'S NOTE—Since our correspondent's money figures were in great part given in round numbers, we have used \$5 as the equivalent of the pound sterling, 25 cents as the equivalent of the shilling, and 2 cents as the equivalent of the penny in converting his figures to American money.

Union. The total area, therefore, under the present jurisdiction of the South African Union is 795,000 square miles, with a white population of 1,542,000 and a native and colored population of 5,613,000.

Mileage of the Railways

With the exception of a few unimportant private lines—the most notable being the New Cape Central Railway, 203 miles, between Mossel Bay and Worcester in the Cape province—all railways and harbors in the area defined are administered and controlled by the South African Railways & Harbors Administration.

The state railway system in South Africa is laid to two gages—the standard, or 3 ft. 6 in. gage, and the 2 ft. gage—with a combined route mileage distributed in the various provinces as follows:

Province	3 ft. 6 in. Miles	2 ft. Miles	Total both gages Miles
Cape	3,967	288	4,255
Transvaal	2,617	27	2,644
Orange Free State	1,342	...	1,349
Natal	1,073	246	1,319
	8,999	561*	9,560

*The 2 ft. gage lines are negligible. They are chiefly light developing agencies in certain country districts.

The track mileage of the government-owned lines is 10,903, made up of 9,391 miles of single-track, 154 miles of double track, 2 miles of triple track, 12 miles of quadruple track, and 1,150 miles of crossing loops and sidings.

The total mileage of all railways in the Union of South Africa is 10,057 miles, comprising the 9,560 miles of state-owned lines and 497 miles of private railways. The mileage actually operated by the South African Railways & Harbors Administration in 1922 was 11,532 miles, made up as follows:

S. A. R. lines.....	Miles 9,560
Lines in Southwest Africa.....	1,331
Private railways	641*
Total	11,532

*This includes 588 miles of line operated on behalf of the Rhodesian Railways.

Plan of Organization

As previously stated, the unified administration of government-owned railways came into being on May 31, 1910. It is therefore a little more than 12 years old. Prior to that date the railways in South Africa were controlled and operated by the three separate colonial administrations of the Cape Colony, Natal and the Transvaal and Orange Free State, the two latter territories being jointly served by what was known as the Central South African Railways Administration. The reader familiar with the complexities of modern railway practice will appreciate the magnitude of the work of reorganization involved in the process of amalgamating three railway concerns each possessing traditions, policies, operating methods, systems of accounting, general conditions of service and equipment that varied in marked degrees.

The management of the former Cape and Natal Government Railways was conducted on the departmental system of operation, which adhered to hard and fast dividing lines between departments and tended towards working on water-tight methods. The Central South African Railways, on the other hand, had adopted, some time before 1910, the divisional or decentralized method of organization, based on the practice of most railways in America. The efficacy of the divisional system had been amply demonstrated by the Central Southern African Railways, and in all essentials it presented itself as the most favorable and effective organization for administering the newly enlarged and far-flung service of the Union in 1910. Its economical virtues had also been established by the C. S. A. R. Therefore, the organization for the control of the South African Railways Administra-

tion, with its headquarters at Johannesburg, was divided into three main systems under the control of assistant general managers. Each system was further decentralized into divisions, in charge of divisional superintendents who were responsible to the respective assistant general managers for the working of the divisional areas in the systems.

Independent of the systems and divisions there was the universal control of the general manager at headquarters with his chief technical officers and advisers, such as the engineer-in-chief (now termed chief civil engineer), chief mechanical engineer, chief railway storekeeper and the chief accountant, whose duties in their respective spheres were common to the whole railway service. The present organization consists of four main systems and seven divisions excluding the railway area of the territory of South-West Africa, which may be regarded as an additional system.

Growth of the Railways

Under the decentralized system of operation the work of consolidating the enlarged railway service in South Africa commenced in 1910. During the 12 years of unified administration, the capital expenditure on railways has increased from \$375,000,000 to over \$515,000,000, or at an average



Interior of Dining Car on the S. A. R.

rate of roughly \$12,500,000 per annum. The more direct influences of the war, however, necessitated the curtailment of many important capital works between the years 1916 and 1919, when progress with extensive developing schemes and a number of new lines for linking up routes to greater advantage and opening up large tracts of country, rich in agricultural and mineral resources and industrial potentialities, either ceased altogether or was seriously retarded. After the conclusion of hostilities the prevailing uncertainty of commerce, combined with financial difficulties arising out of an artificial state of trade prosperity which culminated in widespread depression, produced profoundly unfavorable effects upon the prompt revival of a policy of internal development through the medium of the railways.

In spite of the difficult times and the financial problems encountered after 1914, the record of the South African Railways since their amalgamation has been notable for advancement in all directions. The open mileage of lines has increased from 6,892 in 1909 (the year before the railway amalgamation) to 9,560 miles, an increase of 2,668 miles, or 39 per cent, while the total mileage operated has risen from 7,692 to over 11,500 miles. Though the actual increase in the open mileage has been satisfactory under the circumstances which have prevailed, the railway extensions carried out since the date of union, were almost solely con-

fined to the brief period between 1910 to 1916. After the latter year the construction of new lines in South Africa, except for one or two lines constructed as military measures, had to be temporarily abandoned owing to the impossibility of obtaining regular and adequate supplies of materials from overseas and also to financial restrictions imposed by war conditions. The additional mileage opened since 1910 does not represent, therefore, anything approaching the probable rate of railway expansion which would have taken place had the dislocating effects of the prolonged struggle in Europe not intervened.

Construction Resumed

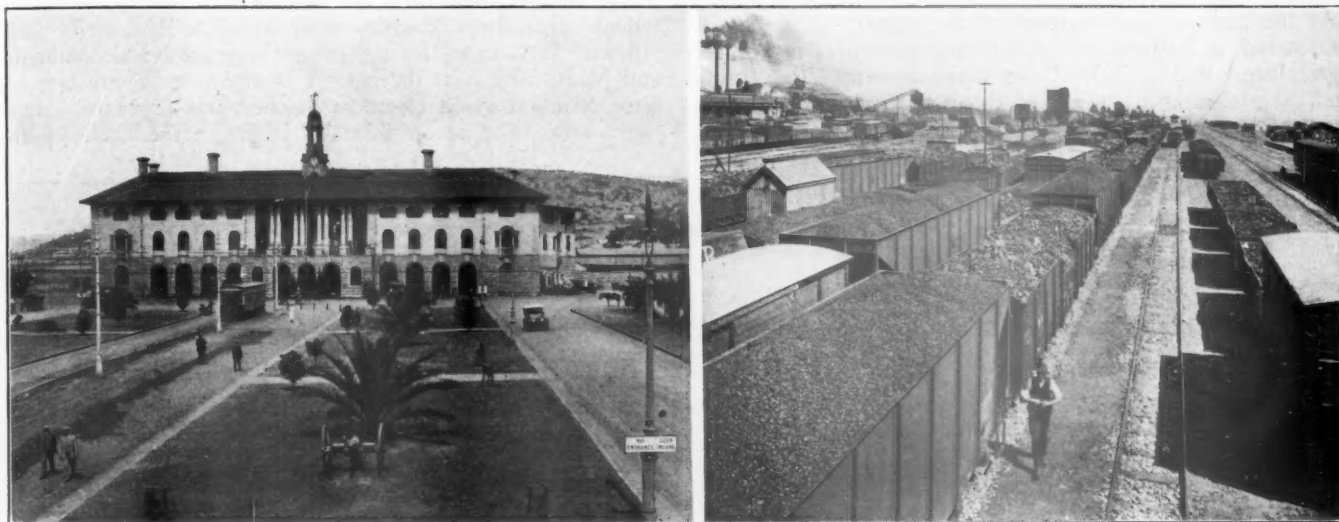
During the current year—1922—new construction measures have been resumed under a comprehensive scheme designed to provide 853 miles of new lines in South Africa at an estimated capital outlay of over \$20,000,000. The policy of opening up the country with new lines has been revived, and there is every promise that the delays in new construction, suffered during the past six or seven years,

standards of main and trunk lines, the heavier traffic conveyed, the higher rates of remuneration granted to the staff together with shorter hours of duty and improved conditions of service, the enhanced costs of materials and equipment due to the war, and increased provisions for depreciation. In the interval between 1910 and 1921, salaries, wages and allowances paid to all grades of the staff have been increased by close upon \$60,000,000.

Current Statistics

At the beginning of the current year the South African Railways had 1,834 locomotives, 3,007 passenger cars and 32,048 freight cars of all classes in service. The total tractive force of the standard (i.e., 3 ft. 6 in.) gage locomotives is roughly 46,000,000 lb., the average tractive force 25,664 lb. and the average weight 68 tons. There are over 300 locomotives in service with a tractive force varying between 30,000 lb. and 46,000 lb. and upwards. The average weight of these locomotives varies from 92 to 108 tons.

The aggregate capacity of the standard freight cars in



Station at Pretoria and Coal in Witbank Yard

will be steadily overtaken. The present capital cost per open mile of the South African Railways is approximately \$54,000.

The Increase in Traffic

At the present time, a broader and more reliable index to railway progress and, incidentally, to the internal development of the country and its trade, is more vividly embodied in the notable growth of railway traffic under all heads. In the 12 years of unified administration the annual revenue of the railways has advanced progressively from \$52,280,000 to \$138,090,000, an increase of close upon 130 per cent. The yearly passenger receipts have increased from \$12,500,000 to \$30,000,000; freight traffic earnings from \$26,250,000 to \$50,000,000; and coal traffic earnings from \$8,500,000 to close upon \$20,000,000. The total volume of revenue-earning traffic has risen from 8,935,000 to 16,435,000 tons or by 83 per cent, and the number of passengers carried from 28,000,000 to over 64,000,000 an increase of 36,000,000 or 127 per cent. The tonnage of freight traffic has increased by 3,750,000 tons or 100 per cent and the volume of revenue-earning coal traffic by 3,750,000 tons or 72 per cent.

During the same period the annual gross operating expenditure, including depreciation, relaying and strengthening, has risen from \$28,380,000 to \$93,235,000 or by 228 per cent. This enlarged expenditure has been brought about by the opening of new lines, general improvements in the

service amounts to 631,386 tons with an average capacity of 21 tons. The individual capacity of the various classes of freight cars ranges from 10,000 lb. to 80,000 lb. and over.

The train miles run during the past year amounted to 33,000,000 and the train and engine mileage to 42,000,000, representing increases of nearly 40 per cent compared with the corresponding returns for the year 1910. The earnings and expenditure per train mile last year amounted to \$3.18 and \$2.62 respectively, while the earnings per open mile were \$10,885 and the expenditure \$9,005. The operating ratio was 83 per cent and the percentage return on capital \$12.12. In the year 1910, the corresponding figures were 54 per cent and \$35.20.

In 1922 the railway personnel, excluding the construction staff, comprised 66,452 officers and employees, made up of 36,049 Europeans and 30,403 native and colored workers. In addition to the above there are 1,545 persons employed on construction and 4,221 at the harbors, making a total staff of 72,218 in the employ of the Railways & Harbors Administration.

Deficits Faced

During the financial year ended March 31, 1922, the surplus of railway earnings over gross operating expenditure amounted to \$17,965,000. The net loss after payment of interest and other charges was \$6,965,000. The final result of the year's operations, including railway, harbor and steamship services conducted by the Administration, was a

net loss of \$7,950,000. This loss, together with the deficit of \$12,995,000 accruing from the previous financial year, resulted in a total accumulated deficit on March 31, 1922, of \$20,945,000—due chiefly to the reactionary effects of the post-war years which have been referred to.

While the railways of South Africa, like many other national institutions today, are working without any margin of profit owing to the effects of deflation and universal trade depression, the present financial position is quite misleading because it obscures the larger record of progressive development which careful and considered analysis of the yearly results of operation and the detailed returns of traffic since 1910, clearly reveal. In the aggregate those developments have placed the railways in a position to deal economically with the larger volumes of traffic which must inevitably materialize when trade and production improve.

Railways Primarily for Development of Country

In this connection it may be observed that the terms of the South Africa Act, prescribing the terms of the Union of the South African provinces, contains specific provision that the railways and harbors of the country shall be administered on business principles with particular regard for agricultural and industrial development within the Union and the promotion by means of cheap transport of the settlement of an agricultural and industrial population in the in-

land districts of all the provinces of the Union. Since 1910 the larger aims of railway administration in South Africa have been consistently shaped to that end.

Though increases in rates have been dictated from time to time by serious fluctuations in certain classes of traffic since the war, many of the tariffs of the South African Railways still rank among the most moderate in the world, more particularly those for low-rated traffic in agricultural products and other goods and commodities derived from internal development. In recent months very substantial reductions have been made in the tariffs applicable to agricultural products and livestock. It is noteworthy, too, that since the year 1910 the average earnings per ton of freight have dropped from \$6.89 to \$6.62 in 1921-22, owing to the increased proportion of low-rated traffic (about 90 per cent of the total traffic conveyed) which has come to hand as a result of the process of internal expansion fostered by economic tariffs.

Those are some of the larger results of railway achievements within the past 12 years. Their deeper significance is not readily discernible, but they have conferred very material benefits upon the country. It only requires a return to more settled conditions with a stabilizing of demands in oversea markets to bring to light the actual extent of the development that has taken place in the Union as the result of improved transportation facilities, not only in agricultural enterprises and increased productions of maize, grain, fruits and other products, but in the fuller exploitation and heightened output of base metals, minerals and raw materials, as

producing areas of the Union; in the construction of one of the largest graving docks in the world at Port Natal and the establishment of industrial sites and oil-storage grounds at that harbor; in the general schemes of port improvements proceeding at Walvis Bay, Cape Town, Port Elizabeth, East London and Durban, including extensive outerworks, the deepening and extension of existing wharfage and berthage accommodation and the provision of more up-to-date facilities in storage space and handling equipment; in the exploitation and extension of road motor services for opening up country districts and providing new feeders to the railways; and also in the steady progress with comprehensive schemes of main and branch line improvements including double tracking and regrading of extensive sections of line.

Concurrently with railway and harbor expansion, large irrigation works are being developed in different sections.

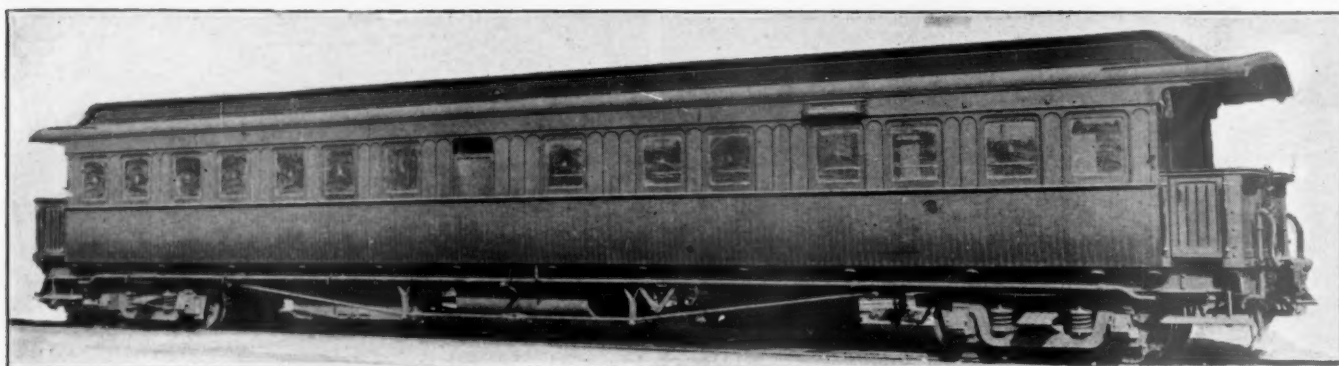
In the aggregate, the numerous developments which are now being pressed forward in the Union are destined to produce far-reaching effects upon the agricultural and industrial activities of the country and, through those channels, upon its growing trade and commerce. South Africa is possessed of the most varied and rich resources. Though its general progress up to the present date has been remarkable enough, it is still essentially a developing country awaiting the necessary influx of population and capital in sufficient volume and force to open up the great store-houses of national wealth locked up in its agricultural and mineral assets and its abundance of raw materials.

Forward Movement Revived

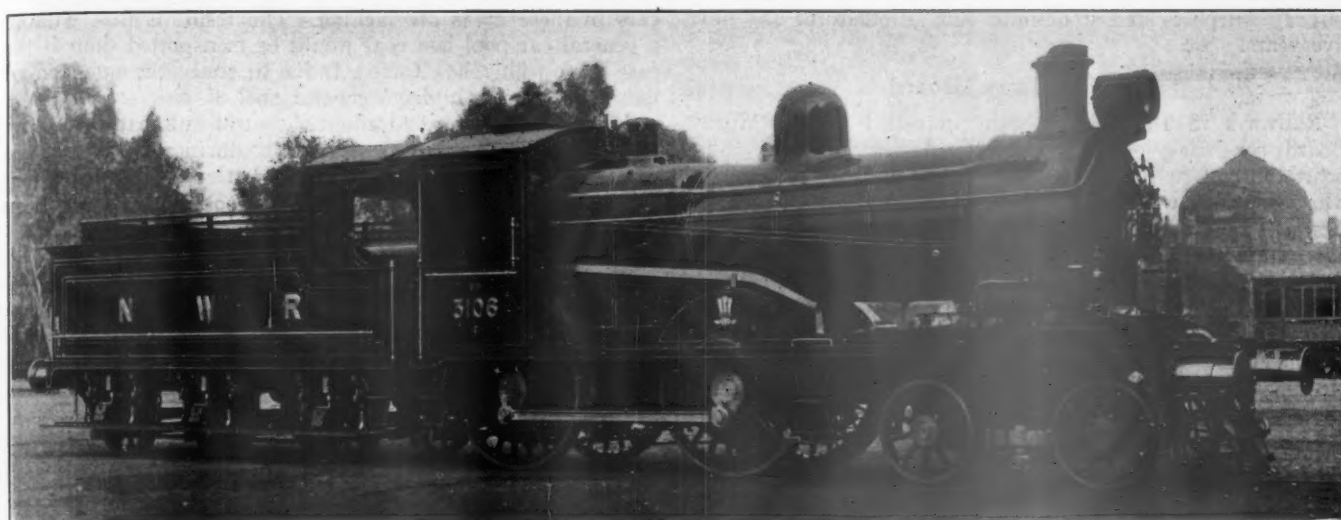
Though the financial position in recent years has necessitated the exercise of widespread economies, involving the limitation of capital works and larger schemes of expansion, the broad policy of development has never been wholly subordinated to the state of depression. Following up numerous indications of improvement in trade and the economic position today, the government has re-embarked upon bold and vigorous measures for railway and harbor expansion, and the past year has witnessed the start of a big "forward movement."

Projects Planned and Under Way

This is perceptible in the comprehensive construction program of 853 miles of new lines now proceeding and estimated to cost well over \$20,000,000; in the \$25,000,000 scheme of railway electrification which will electrify 250 miles of track on the main route between the Natal coalfields and Maritzburg near the port of Durban; in the erection of large terminal grain elevators at the ports of Durban and Cape Town and at 34 inland stations in the chief grain-



First Class Sleeping Car on the South African Railways



Locomotive Used to Haul Prince of Wales' Special Train in India

Many Railway Developments in India in 1922

Future Control of Properties Still Undecided—Officers Are Studying American Methods

From a Correspondent in India

LAHORE.

THE YEAR 1922 was a year of the greatest importance in the history of Indian railways, as many vital questions affecting their interests were decided during that period. The burning problem at present is the question of their future management. During 1921 a commission of ten members under Sir William Acworth, K.C.S.I., visited India to report on certain problems. The main question was the future management of railways in India and the committee had to consider four possible methods of management, namely:

- (1) Management by English companies,
- (2) Management by a combination of English and Indian companies,
- (3) Management by Indian companies,
- (4) Management directly by the State.

India in the past has dealt with railway problems in a manner peculiar to herself. At first the railways were financed and constructed by companies supported by a guarantee of the government of India. Later on, the policy of direct state construction from borrowed capital was started and steadily adhered to for some years. After a time the difficulty of finding the necessary capital by direct borrowing induced a return to the previous procedure, the state retaining the power of purchase after a definite period of tenure. The power of purchase has been consistently used to acquire railways as the companies' contracts expired. The following table will show the mileage of railways and their ownership:

	Miles
Railways owned by government.....	26,889
Railways owned by Indian states.....	4,394
Railways owned by private companies.....	5,746
Total	37,029

8,929 are operated under direct government control, and of the remainder of the mileage in India, 2,889 miles are operated by Indian states, and 25,211 miles by companies. These companies are all domiciled in England and in addition to a definite guarantee of interest they are entitled to take a share of the surplus profits so that there is every incentive for efficient management. Thanks partly to the presence of these companies' lines, state railway management in India has never suffered so far from the evils met with in other countries.

Recommendations of the Acworth Committee

Since 1917, however, there has been a great awakening of the political consciousness of the peoples of India and daily there is a growing demand that India should be mistress in her own house. On the burning question of future management the Acworth committee were equally divided. Five members, including Sir William Acworth, were in favor of direct state management while the remaining five were in favor of a combination of direct state management and of companies domiciled in India. It is considered by many that Sir William Acworth and the four members who agreed with him have not suggested the right solution.

Financing Improvements

Another great difficulty in India is the question of financing new works and improvements. Up to the present, the railway budget has been joined up with the general budget of the country. When money was easy, the railways were able to obtain sufficient funds, while when times were hard, railways had to go without the money they required. Funds may have been allotted for some large work one year but next year owing to the lack of funds work would have to be stopped. This makes the final cost much higher. The Acworth commission was unanimous in favor of the separation of the railway budget from the general budget of the country. Since the Acworth commission, a loan has been raised for

It will be seen that nearly six-sevenths of the total mileage belongs to the government and nationalization, so far as ownership is concerned, has therefore been practically effected.

But of the 26,889 miles owned by the government, only

railway purposes and a definite sum allotted for the next five years.

The Railway Board

Railways in India have been controlled by a Railway Board consisting of a president and two members. The board reports to the viceroy through a member of council, who combines with his railway duties other duties. The Acworth commission has recommended that there should be a separate member of council for communications and that the Railway Board should consist in the future of a high commissioner for railways, who would be the head technical officer, and four assistant commissioners. So far a high commissioner has been appointed who took over his duties on November 1. It will necessarily take him some time to organize the remainder of his department.

India is passing through the same difficulties that every other nation has gone through. When railways are first started in a country, it is the construction engineer who is the important individual on a railway. But once the railway has been fully equipped with permanent way, buildings, etc., and traffic have begun to develop, it is the transportation man who must come to the fore. This change is gradually taking place in India.

New Statistics Adopted After

Study of American Methods

It may interest American readers to know that a committee has been formed for the revision of statistics and one of the members of the committee spent two months during 1922 in studying the statistics kept by the Interstate Commerce Commission, the Car Service Division of the American Railway Association and by five of the leading railways in America. He also spent two months in England on similar studies and it is to be hoped that the revised figures will

cars in these areas are lacking. The result is that without a general car pool less coal would be transported than is the case now. This has forced India to study the question of the repair of cars under a general pool.

It has been decided to adopt a central automatic coupling and an officer was sent to America during the latter part of 1922 to study the conditions there. Central couplings are employed on narrow gage trains but so far have not been used on the broad gage.

The Problem of the Gages

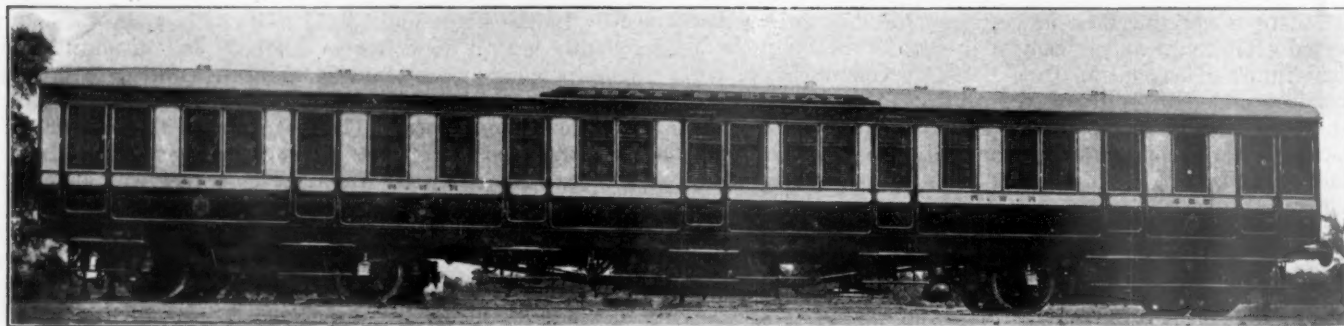
India has a diversity of gages. There is little likelihood, however, of any decision being taken in the future to adopt one gage for all railways as has been done in Australia and is being considered in Japan. The following statement will show the mileage of the various gages:

Broad gage (5 ft. 6 in.).....	18,195 miles
Meter gage (3 ft. 3 3/4 in.).....	15,248 miles
Narrow gage or feeder lines (2 ft. 6 in.).....	2,948 miles
Narrow gage of hill lines (2 ft.).....	638 miles
Total.....	37,029 miles

Shortage of Coal

In all countries local conditions have forced railway engineers to study certain questions more fully than in other countries. One of the great difficulties at present experienced in India is the lack of coal which has been accentuated by the political activities of the "non-co-operators" under Mahatma Gandhi. As has already been pointed out, the coal fields are only found in certain areas and this means a long haul for many railways. The demand for coal in India is increasing daily owing to an increase in industrial activities.

As the standard of living in India is low compared to other nations and as wages have increased in the coal fields during the last few years, workers have not found it neces-



A Second and Third Class Car with Compartments for Servants at Either End

be of greater value than they were in the past. It will be necessary to guard against the practice met with both in America and England of producing a large number of figures which nobody uses. Some American railways are offenders in this respect. Probably the most efficient statistics in the world are kept up by one American railway which shall be nameless and which is closely followed by an English railway which is ahead of many American railways.

The Car Pool and the Introduction of Central Coupling

Other problems which were discussed during 1922 were the continuation of the general car pool and the introduction of a central coupling. At a meeting held in October, 1922, of the presidents of railways (or agents as they are called in India) it was decided to continue the general pool of cars for another three years. This was done after an experience of some years of the working of a general pool. India has her own special difficulties and the chief one, as far as the car user is concerned, is the fact that areas of coal production are very limited and sufficient facilities for dealing with

sary to work so many days in the week to obtain sufficient funds to support themselves and their families. Americans have not probably realized that out of the 300 million inhabitants of India the average earnings per day of a very large percentage (10 to 15 per cent) do not exceed 8 to 12 cents a day and on this magnificent pay of 12 cents a native feeds and clothes a family. A much larger percentage receive less than 25 cents a day. The western mind cannot understand the eastern ideas of life. "Non-co-operation" is the negation of many of the ideas accepted without thought by the remainder of the world. Yet in spite of this it appeals to a large number of Indians. To be told that you must not attend schools, that you must give up your practice as a lawyer, that you must not use such things as trains or telegraphs, that you must spin cloth for your own clothes by working at a spinning wheel for so many hours a day, that you must not buy any foreign goods, and that by following these methods you will obtain "Swaraj" (home rule) for yourself would be beyond the understanding of Americans. Yet these are some of the tenets of Mahatma Gandhi.

Oil Fuel

Due to the difficulty of obtaining coal, the question of the use of oil as fuel is being further considered. So far the North Western Railway of India has converted for oil burning 129 locomotives and the Great Indian Peninsula Railway about 70 locomotives. Many of these have been in use some years and have proved most satisfactory. During the last few years it has been discovered that the oil bearing belt passes through the north of India and various companies are making trial borings for oil. One company has already started to produce oil and the fact that this oil is found in areas situated at a long distance from coal bearing areas will probably influence the question whether more locomotives should be converted for the use of oil or not. The following statement shows the great increase in the price of coal since 1913:

Price of coal at pit in 1913	\$1.33 a ton	Cost, including freight charges, on arrival at North Western Ry....	\$4.00 a ton
Price of coal at pit in 1922	\$2.66 a ton	Cost, including freight charges, on arrival at North Western Ry....	\$5.33 a ton
Price of English coal landed in India.....	\$11.00 a ton		

N. B.—Large quantities of English coal had to be ordered owing to shortage of local supply.

Electrification

Fortunately for India, she has other means of producing power, as nature has been lavish in the provision of great rivers. It has been decided to produce power on a large

being tried in increasing numbers and one railway is putting down 100,000 ties a year. Concrete is also used for many other purposes, such as telegraph posts, boundary posts, etc. Not only is it possible to find most of the materials necessary for making concrete on the ground but concrete withstands the ravages of the many types of destructive fauna met with in India such as white ants. Soft wood is also being used for ties after treatment and large tie treating plants are being installed for this purpose.

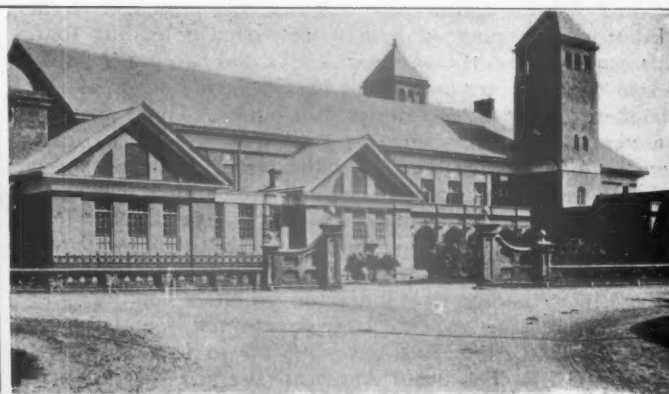
Wages

The following table will give some idea of the present wages of various grades of railway employees. The table also shows the scales paid before the war and the amounts received monthly will probably surprise many American readers.

	Monthly pay in 1913		Monthly pay in 1922	
	Minimum	Maximum	Minimum	Maximum
European Station Masters (Station Agents)	\$33	\$170	\$83	\$217
Indian Station Masters.....	12	35	21	63
Assistant Station Masters.....	10	33	15	47
Guards (Conductors).....	15	83	23	125
Second Guards	9	12	18	21
Points Men (these men operate hand controlled switch levers)...	3	3½	5	6½
Indian Drivers (Engineers).....	13	30	20	43
European Drivers	67	113	93	153
Maintenance of Way Laborers....	3	4½	4½	7

Labor Unions

So far, labor has never been organized in India and the eastern idea used to be that the employer was the employee's



A Yard and an Employees' Recreation Building in India

The yard is at Lahore, the headquarters of the North Western Railway, which has a railway population of 20,000, including office workers and shop employees. The train entering the yard is made up of 72 cars of coal. The recreation building is typical of many provided by the railways for their employees. It contains a dancing hall, stage, billiard rooms, library and a bar.

scale by damming the Sutlej river and using the head for a large hydro-electric installation. This will supply power over a large area. As soon as this power becomes available, the electrification of the Kalka-Simla Railway, a 2-ft. gage line about 60 miles in length, will be taken in hand. This line is the only railway to Simla, the summer headquarters of the government of India, and rises 4,700 feet in 60 miles. Many engineering difficulties had to be overcome before this railway could be completed and in one place one can see the line on three different levels on the same side of a hill.

Large towns like Bombay and Calcutta have their transportation difficulties and it has been found that it is becoming impossible to carry the daily working population into Bombay except by the installation of electric traction. It has been decided to electrify the lines into Bombay and work will be started as soon as funds are available.

Ties Difficult to Obtain

Another problem that India has to face is the difficulty of obtaining suitable timber for ties. The present cost of a broad gage tie is over \$2.50 and even at this price it is not possible to obtain a sufficient number. Concrete ties are

father and mother and that in his hands the fate of the employee was safe. Lately unions have been started but the idea at present is quite contrary to the eastern mind. The leaders in most cases have no connection with the railway and the agitation for increased wages, etc., is generally started on political grounds. The "non-co-operators" have realized that the field of labor is a very profitable field for them to exploit. They can cause a large amount of trouble without any harm to themselves. Certain railways are taking steps to guide their own men on the right lines but it will probably be many years before union ideas are instilled into the mind of the Indian worker.

Public Relations

The question of publicity is coming very much to the fore. So many misstatements of fact are made that railways are finding it necessary to try and instruct the general public about the true facts of the case. This is much the same in America and it is amazing how similar are many of the problems met with in this country and in America.

Many think of India as one country, but a far truer idea is obtained if you think of it as a continent. It is as large

as Europe, excluding Russia, and has as many different races and languages as are found in Europe. It has greater differences in temperature and rainfall. In some parts of India rain is not seen for years while in one place the average yearly rainfall is nearly 600 inches. This, of course, is purely local and much above the maximum in any other parts. The summer temperature in the north is 100 deg. F, or more, in the shade for over four months in the year, while the maximum day temperature may vary between 110 deg. and 120 deg. in the shade for two months. At this same place in the winter the temperature may go down to freezing point at night. In other parts of India the temperature does not rise much above 90 deg. or below 70 deg. during any part of the year. It is possible for a passenger car to start from a place where it freezes at night and to end up its journey in a shade temperature of about 90 deg. after passing through a sandy desert where there has been no rainfall for many years. The question of lubrication therefore is one of great difficulty.

Types of Passenger Cars

The illustrations will show the types of the latest third-class and first-class passenger cars. There are four classes in India, first, second, intermediate and the third, and the fare charged for the third or lowest class is two-thirds of a cent a mile. Quite lately the rate charged was only one-half a cent a mile. First-class fares vary between three and five cents a mile. The fares at present are on a tapering scale, so the average fare for a long distance is something between $3\frac{1}{2}$ and 4 cents a mile. For this rate this passenger is entitled to one sleeping bunk in a compartment holding four. This compartment has two lower bunks and two upper bunks and in all new cars each bunk has its own fan, or at any rate there is one large fan for two bunks. There are also two comfortable chairs in many compartments. In addition, there is quite a large lavatory with a big bath or a shower bath, as well as a basin. The floor space in a four-berth compartment, excluding the lavatory, is 104 square feet. Two-berth, or coupé, compartments, each with its own lavatory, are also available.

Even in a country like India the primitive conditions of the usual sleeping car in America are not found. It is wonderful that Americans have put up so long with this state of affairs. The usual American sleeping car is unhygienic and uncomfortable and the sleeping accommodations found in England and on the continent of Europe are far superior.

Differences Between American and Indian Practice

There are certain other points in which railway conditions in India are better than those in America. Many an Indian engineer at \$20 a month is far less rough in starting and stopping a train than most engineers in America drawing many times this pay. It often feels like a young collision when the train starts or stops in America.

It is more difficult for a foreigner to find out at what station he is in America than in India. Every American is proud of his own city; so why does he not see that the name is displayed in some prominent place? Many more high level platforms are found in India than in America and it is not necessary if you are old and infirm to be pushed up from behind to get into the train in India.

India Learns from America

India watches the methods by which railway problems are being solved in America and is always trying to learn. America has the great advantage that she has a much more efficient staff and so it is possible for superior officers to introduce new methods. Here in India personal supervision takes up such a lot of one's time that it is difficult to study the latest methods. Still the general tendency nowadays is

to follow American methods rather than English as the conditions out here correspond more closely to the American than the English.

Divisions are much longer than in America. Traffic is not as heavy as in America yet, owing to the large amount of single track, careful supervision is very necessary. The following table shows the relative length of each kind of track:

Single track	33,985 miles
Double track	2,948 miles
Triple track	29 miles
Quadruple track	64 miles
Quintuple track	2 miles
Sextuple track	1 mile
Total	37,029 miles

"Train Control"

Most lines are now introducing "train control," by which means the control of a certain length of line is continually under one official who instructs station agents (or station masters as they are called in India) which train must have precedence over another, etc., etc. The practice in India differs from that in America in that the engineer merely has to obey signals and the station agents decide which train must have precedence under orders from the control officer where train control exists.

Change of Organization on the G. I. P. Railway

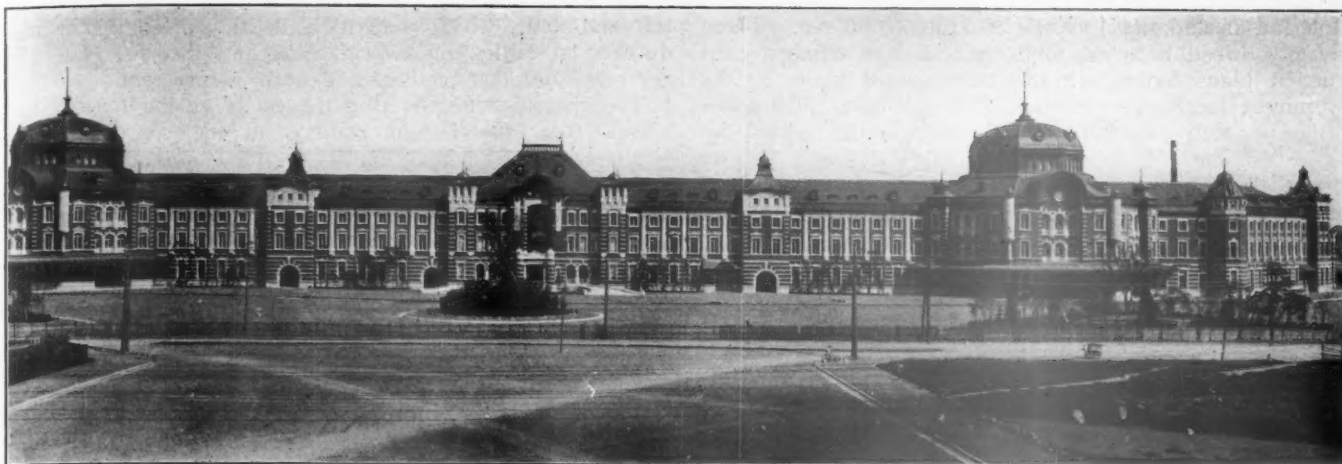
The Great Indian Peninsula Railway introduced a new system of organization on November 1, 1922. Instead of there being three departments, the engineering or maintenance of way, the traffic (which combines the traffic and operating departments as known in America), and the locomotive or motive power department, this road has organized four departments, viz., the maintenance of way, the commercial, the operating and the mechanical. American methods are not exactly followed out but have been adapted to suit Indian conditions and it will be interesting to see what further changes there will be. The tendency of the future will probably be to place the engineer under the operating department instead of under the locomotive department as is found on most Indian railways. This same tendency is also noticed in England today.

India has certain other problems which are not met with in America. At present many of the stores used are only obtainable in England or America and it takes three to six months to secure them; therefore, larger stores balances have to be kept. Railways in India have to supply most of their staff with free clothing. The North Western Railway of India with its 5,700 miles of line and its employees numbering over 100,000, issues in a year some 600,000 articles of clothing, half of which is made up in its own shops.

Difficulties Experienced With Vacuum Brake

Although most of the freight cars are braked, yet difficulties are being experienced in running long trains fully braked with the vacuum brake. A train of 72 cars has been run after special preparation but it is not yet a practical proposition. The climate and conditions in India are all against air-tight joints and rubber perishes rapidly in India compared to America. The only alternative to the adoption of the Westinghouse brake would appear to be the use of heavier cars if one wants to run heavier freight trains fully braked. At present many of the freight trains are run partially braked.

Heavier locomotives also are being introduced, which has necessitated the strengthening of many of the bridges. It is proposed to use the Mallet type of locomotive on some of the heavy grades near the frontier. In Baluchistan some of the grades on the 5 ft. 6 in. gage lines are four per cent for lengths of over a mile. Electrification in these cases would not pay as the traffic is not heavy enough as yet.



Tokyo Station, Japanese State Railways

Recent Developments on Japanese Railways

Steady Progress Being Made in Electrification and Construction in Spite of Depression

IN CONSIDERING or studying railway conditions in Japan American readers must remember that that country is the only Oriental country which controls its railroads without interference from some foreign country because of

way of thinking and doing things between the East and the West. On the other hand, it must be remembered that Japan, more than any other country, has sent its railroad officers to all parts of the world to study railroad conditions and to find what devices and practices are productive of the best results in each of these countries. In this way it has adopted not a few of the best foreign railway practices, although in applying them it has done so in its own way and according to its own ideas.

Japan is still in the grip of the business depression which followed the World War. It is confronted with serious financial difficulties which it will take time to solve. Unemployment is much greater than under normal conditions. All of these things of course reflected upon the operation of the Japanese railways during the past year. It would seem, however, that the Oriental mind does not consider depressions of this sort in quite the same way as does the railway executive in this country. Those in charge of the Japanese Government Railways have laid out programs of improvement to extend over long periods, and it would appear that these programs have largely been carried forward during the past year in spite of the prolonged business depression.

Construction Activities

The Imperial Government Railways, in pursuance of its 10-year program, expected to construct 331 miles of road during the fiscal year ending March 31, 1923, as well as make other important improvements. It has also been reported that in all about 6,000 miles of new lines in Japan have either been approved of or are in prospect during the next few years. Some of this construction involves difficult engineering work, one instance of which is the tunneling of the straits at Shimonoseki, made necessary by the fact that the present ferry system is inadequate for the steadily increasing traffic. It is expected that work on this tunnel will start shortly and that it will be completed by 1928 at an estimated cost of 18,000,000 yen. The tunnel will be four miles in length.

Not all of the new railroad mileage will be owned by the Japanese Government Railways. There are now more than 150 privately owned railways in Japan, with a mileage of



Map of Japanese Railways Showing Proposed Electrification

political power, foreign concessions or the investment of foreign capital. In other words, no Occidental influences are brought to bear in Japan except insofar as they appeal to the Oriental mind—and there is a vast difference in the

2,160 and an authorized capital of 316,000,000 yen. These privately owned lines are to be increased in number, construction plans having already been passed upon by the government for 87 new roads. This will add 1,029 miles to the privately-owned lines and increase the capital by 77,027,000 yen. A considerable number of other private railways have been granted charters, but have not yet had their plans passed upon.

Electrification

Coal is scarce and expensive in Japan but a large amount of water power is available when properly developed. (A total of 800,000 hp. has already been developed, it is said, and construction is under way for the development of as much again.) The present steam operated narrow gage lines have in many cases been severely taxed because of the rapid growth of traffic in recent years. The freight tonnage carried, for instance, increased from 35,000,000 tons in 1913 to 52,000,000 tons in 1921 and the number of passengers carried increased from 166,000,000 in 1914 to 418,000,000 in 1921. In order to increase the capacity of the lines and to take advantage of the water power, the Japanese railways have developed an extensive program of electrification. At present the railway is electrified between Tokyo and Yokohama and in the vicinity of Tokyo. Eventually the electrified line will extend from Tokyo to Kobe; it is planned to complete the extension as far as Yokosuka and Odawara by the end of the next fiscal year, thus adding about 44 miles to the electrified section.

During 1922 eight 60-ton electric locomotives were ordered for use on freight trains on that section which is now electrified, principally in the vicinity of Tokyo. Two of these locomotives were ordered from the Westinghouse Electric & Manufacturing Company and were completed last August; two from the General Electric Company were shipped during the month of December; two from the English Electric Company in Great Britain, were delivered in November; and two were ordered from Brown Boveri & Co. of Switzerland. It is understood that these will be given a thorough trial to decide just which make is best suited to Japanese conditions.

An order has also been placed with the English company for 34 electric locomotives for delivery this year. Eight of these for heavy express passenger service are of the 4-6-6-4 type. These will weigh approximately 96 long tons and are designed to haul a 415-ton train at a balancing speed of about 60 miles an hour. Nine of the locomotives are for local passenger service and 17 for freight service. Both of these classes are of the 4-4 type, weighing about 56 tons each. The locomotives for local passenger service are designed to haul a 315-ton train at a balancing speed of about 55 miles an hour, while the freight locomotives will haul a 600-ton train at a balancing speed of about 40 miles an hour.

A hydro-electric power station to generate 65,000 kw. is now under construction at Shinanogawa, to cost 39,500,000 yen. A 12,000-kw. supplementary plant, operated by steam, will also be constructed.

Plans are also being made to build a subway in Tokyo.

Freight Rates Reduced

Freight rates were increased about 20 per cent in 1918 and about 28 per cent in 1921. On August 25, 1922, the government railways made a cut of from 10 to 30 per cent in freight rates on about 30 important products, thus bringing these charges down almost to a pre-war level. These articles were largely foodstuffs, fuels and other necessities, including rice, barley, wheat, fuel, wood, charcoal, vegetables, miso, soy, raw and cured fish, salt, flour, soya beans, oats, buckwheat, pickled vegetables, eggs and milk. Most of these were given a reduction of 30 per cent, except for

salt and flour, which were reduced 20 per cent. The reduction on millet, buckwheat, peas and raw fish was 15 per cent, and that on beef and pork 20 per cent.

The charges for delivering the goods by the forwarding agents from the freight stations to the consumers are relatively high and in order that the reductions made by the railroads might be passed on to the consumers, the railway officers called together the heads of the forwarding agents' unions and requested that they make reductions in their charges commensurate with those made by the railways. It is reported also that the Tokyo City Electric Bureau will build 70 cars to be used to distribute goods about the city on the street railway lines; special lines will be extended to the principal vegetable and fish markets of the city to facilitate and cheapen deliveries.

The fiscal year of the Japanese Government Railways extends from April 1 to March 31. The latest figures available for freight and passenger traffic revenues on the government railways when this article was prepared were from April 1, 1922, to October 20, 1922. During this period the passenger traffic revenues from the government railways, having a mileage of 6,829, was 6,592,702 yen, a decrease of 353,774 yen as compared to the same period for the previous year. The freight traffic revenues for the same period were 5,051,448 yen, an increase of 143,548 yen as compared to the same period for the previous year. The total revenue from freight and passenger traffic therefore amounted to 11,644,150 yen, a decrease of 210,226 yen, or about two per cent.

Cars and Locomotives

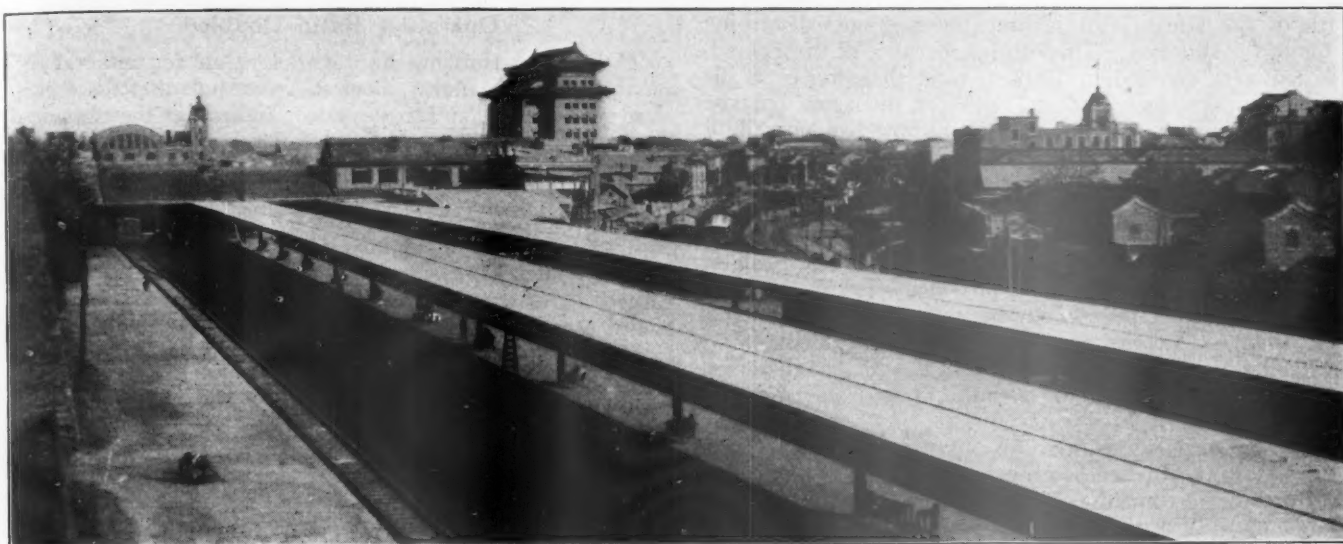
At the end of September, 1922, the government railways had 3,531 locomotives, an increase of 178 as compared to the same date in 1921. There were 8,727 passenger cars, with a seating capacity of 418,827, an increase of 525 cars as compared to the same date in 1921. The government railways at the end of September had 52,489 freight cars, an increase of only 294 as compared to the same time for the previous year. This increase appears pretty small but may be due to a large number of old cars that may have been retired during the year. Many of the freight cars have only two axles; the most recently built cars of this type have a capacity of 15 long tons. The standard freight cars with two four-wheel trucks, have a capacity of 25 tons. It is significant, however, that the 52,489 cars in service at the end of last September had a capacity of only 617,663 long tons, or an average of 11.77 long tons per car.

The normal program for the Japanese Government Railways, if carried out during the present fiscal year, would provide for the addition of 221 new steam locomotives, 18 new electric locomotives, 80 passenger cars for electric operation, 491 passenger coaches and 2,245 freight cars. All of this equipment may not be built during the present fiscal year, although of the 221 steam locomotives 205 have been authorized, while 241 of the passenger cars and 700 of the freight cars had been authorized according to the latest advances from Japan.

The Japanese railways are troubled with a heavy snowfall in the mountainous districts. Orders were recently placed with the American Locomotive Company for two rotary snow plows; these will be the first of this type introduced into Japan.

In the interests of improved operation, and according to program, good progress was made in 1922 in extending the use of air brakes on passenger cars in place of the vacuum brake. It has also been decided to replace the old screw and link couplers with the American automatic couplers. Orders were recently awarded for 66,000 of these couplers. Operation is also being facilitated on heavy traffic divisions by the installation of automatic signals.

No labor difficulties were reported during 1922.



Peking Station of the Peking-Hankow Line

The Chinese Railways Had a Bad Year in 1922

Credit Has Been Wrecked by Political and Military Interference—Labor Problem Appears

By the Railway Age's Correspondent in China

THE RAILWAY situation in China at the end of 1922 presents two outstanding features—(1) wrecked credit, and (2) the beginning of a labor problem.

China of late years has been showing her modernity

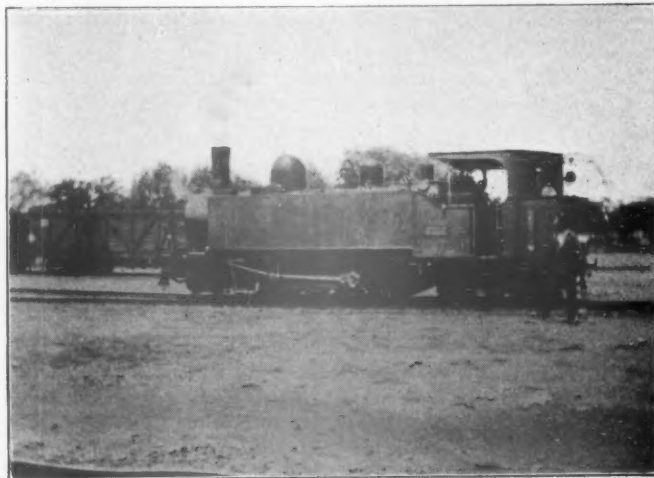
quantities of materials from abroad to be paid for out of future earnings. Then came Wu Pei Fu's action in seizing the revenues of the Peking-Hankow line at the stations, followed by months of civil war which demoralized revenues and sky-rocketed expenses, and finished by Chang Tso Lin seizing and holding on to the Peking-Mukden railway from Mukden as far south as the Great Wall. The trustees for the bondholders of the Shanghai-Nanking line were forced to deliver an ultimatum allowing the government 30 days

PEKING.



Working Logs Into Building Lumber, Chansintien Shops, Peking-Hankow Railway

by making of her railroads a football of politics. The Anfu Club Ministry two years ago began to cash in the considerable reserve funds which several lines possessed and, by forcing the lines to accept the depreciated notes from the two government banks, made it impossible to redeem several foreign loans at the favorable rates of exchange then prevailing. The "old Chiaotung clique" last year began to call in all current cash balances, then pledged the railway credit for bank loans at ruinous rates of interest, and, when both cash and credit were thoroughly absorbed, ordered immense



A Switch Engine on the Cheng Tai Railway

in which to meet the interest on that line to forestall foreclosure proceedings. Interest on the Tientsin-Pukow bonds, due October 17, is still unpaid as well as an overdraft upon the Hongkong & Shanghai Bank for the April interest. Chang Tso Lin's action in seizing the Peking-Mukden line

north of the Great Wall is probably the most disturbing factor in the situation. The surplus revenues of the Peking-Mukden were pledged in 1907 to meet the service on the Canton-Kowloon loan and in 1908 for the same purpose in connection with the Shanghai-Hangchow-Ningpo. Both of these lines have been unable to meet their interest charges, so those expenses have regularly fallen on the Peking-Mukden.

Under the prosperity that has followed Chinese railways up to last year there was still a margin over these pledges, and so an additional burden was put on the Peking-Mukden revenues in 1920 in order to buy equipment for the Hukuang line. Eighteen months ago it was decided to double-track the Peking-Mukden between Tongshan and Shanhaikuan and to build a branch line of 80 miles to the Chaoyang coal district.

These enterprises required an additional loan secured by the Peking-Mukden revenues. On top of this the British officers requisitioned, last year, about double the amount of stores usually required, and for some reason the ministerial officers approved the requisitions. Then came the months of civil war this summer which burned the fire-boxes out of a score or more of locomotives, ruined the interiors of much of the passenger stock, and lost the line more than half of its freight cars—these being used by Chang Tso Lin as he retreated and held by him as part of the spoils of war. Now, with the revenue of the north third of the

Operating Ratio Doubled

The Peking-Hankow line also went in for an orgy of buying last year, and at about the same time that the orders were placed Wu Pei Fu began to commandeer the revenues. Because of Wu's preparatory activities revenues suffered a longer period of depression than on any other line. Wu has now restored the collection of revenue to the Ministry of Communications but requires a cash donation from the Ministry of \$800,000 monthly. At last accounts he appeared to have made a good bargain. In former years the line earned above operating and interest requirements an average of over a million a month. But last year the operating ratio went up from 40 to 48, and this year the figure will probably be nearly 70—as compared with 33 in 1918 and earlier years.

Peking-Suiyuan Has Bad Year

The Peking-Suiyuan is perhaps in the most deplorable position of any of the lines. This line, it will be remembered, is the particular national pride of the Chinese. It was built and ever since has been operated without the assistance of a single foreigner. No mortgage has ever been placed upon the line or its equipment. During the earlier stages of its construction the funds were derived entirely from the surplus earnings of the Peking-Mukden line, and during later stages other government funds and its own sur-



Thirty-ton Gondolas on the Tientsin-Pukow Loaded with Bamboo

line diverted to the coffers of the Manchurian war lord, it is not difficult to understand the straits of the Peking-Mukden line.

Railway Forced to Contract Loans with

Native Banks at Ruinous Interest Rates

The difficulties of the Tientsin-Pukow line have been derived principally from the loans which the Ministry has forced the line to contract with native banks at ruinous rates of interest. Last year a series of scrip bonds was placed with the banks. These bonds are receivable on the lines under the full control of the Ministry in payment of freight charges. Hence the natural revenues of this line have consisted of these small denomination bonds, which must be destroyed as collected. In this way the government actually received the revenues of the line in advance of service rendered.

The railway line is recompensed by being permitted to enter in its accounts the amounts collected as "temporary advances to government." The revenues of this line also were seriously affected by the military movements during April, May and June. Earlier in the season it had suffered because of the floods which last fall destroyed the crops at the southern end.

plus earnings, altogether some \$17,000,000, had been all that were used. During the Anfu regime a short term loan from Japanese sources was used to finance in part the extension to Fengchen, and the terms of this loan are reported to have tied down future foreign financing of the line. The further extension of the line to Suiyuan and now towards Paotou has involved further short term loans from native banks as well as large credits with foreign firms of suppliers.

Accounts a Year in Arrears

Just how great an aggregate is involved no one outside of the immediate officers know, if indeed the officers themselves know. (The accounts are said to be a full year in arrears.) But "educated guesses" by persons who are watching the situation place the total debt of the line at \$40,000,000. Much of this bears interest at rates as high as 15 and 20 per cent, when discounts are included. According to the 1920 "Statistics of Government Railways" net revenues of \$2,291,000 represented a return of 6.6 per cent on the \$34,500,000 cost of road and equipment. Net revenues for 1921 are estimated to have been only about \$1,500,000, hence when interest charges are taken into consideration the line must have had a deficit.

But bad as its position was in 1921, the situation was easy then compared with what it is now. It is doubtful if the line is more than earning operating expenses. Where is the interest on \$40,000,000 to come from? The financial difficulties of the line are increased by its labor troubles. There have been six changes of managing directors during the year, and five changes of chief accountants. Its clerical and office staff is as heavy as that of the Peking-Mukden, a line which earns three times as much revenue and which is admittedly over-staffed itself. Office discipline is absolutely demoralized. A few weeks ago it declared independence of the central government in spite of the fact that the office is located in Peking.

The principal American creditors of the Peking-Suiyuan



Restaurant Service for Third Class Passengers on Any Government Railway

line are suppliers of ties, rail, bridge steel, freight cars and locomotives. The American creditor for cars, back in the summer, worked out and secured the agreement of the officials to a modified equipment trust, by which half of the revenue earned by such cars was to be paid monthly as instalments on the purchase price and accrued interest. The agreement further provided that an accountant acceptable to the American firm should be placed on the payroll of the Ministry of Communications and given charge of the accounts pertaining to these cars. The accountant selected was a Chinese already on the rolls of the Ministry, but this contract was made the occasion for the strike which was the beginning of a series which has now run the gamut of all the lines in north China.

The Labor Problem

The American contract was the occasion rather than the cause of the series of disturbances which followed. The fact that the strike mania proceeded in geographical order from north to south on the lines serving the western border of the coastal plain, and then started in on the coast lines at the north and proceeded southward with the same geographical order to Shanghai is indicative in itself. The grievances have differed on each line except that a demand for an increase in wages has appeared on two or three occasions. At Shanghai one of the prominent demands is for a pension system.

Since strikes have been the fate of other enterprises in the vicinity of the railroads, it is quite fair to say that there is a real labor unrest. But political intrigue is back of most of the trouble on the railways. The "Chiaotung clique" is composed of natives of Canton and Fukien, principally. The present administration of the Ministry of Communications is headed by natives of Shantung, principally.

These lines of cleavage mean a great deal in China. In order to retain clerks of experience, it is necessary for the present administration to depend on many of the minor figures of the "Chiaotung clique" who still owe personal allegiance to dismissed chiefs. The present Shantung minister and director-general have as much trouble with such subordinates as Taft did with the Roosevelt bureau chiefs whom he retained in office. Hence labor dissatisfaction finds ready made leadership.

China Does Not Offer an Attractive Field

for American Supply Men

For these reasons, China does not offer an attractive field for American railway supply men. Undoubtedly, for such essentials as axle oil, ties, and certain repair parts, China will find a way to buy sufficient so that her lines may be kept going. The military necessities of Wu Pei Fu and of Chang Tso Lin *vis-à-vis* each other are such that each will see to it that his principal means of transport does not fail. But he will be a clever salesman who knows when to deal with the military commander and when to deal with the



A Typical Water Tank and Coaling "Stage," Taokow-Ching-hua Railway

civilian administrator—for to hurt the susceptibilities of either is fatal. And he will have to be still more clever to collect in advance of delivery. Yet a recent sensation is that a Dutch-Belgian combination has made an agreement for a loan of \$15,000,000 to pay for materials destined to complete the Chefoo-Weihsien line, the Tsang-Shih line, and the Peking-Suiyuan line into Paotou, the security in this case being a mortgage upon the jealously guarded Peking-Suiyuan line.

Circumstantial reports have it that an advance of £150,000 have already been paid over to the Ministry of Communications, and by it transferred to Wu Pei Fu. These European dealers seem to be more courageous than American

firms, their method being to go ahead and get into trouble, and then trust to their respective governments to get them out. The American plan, on the other hand, seems to be to ask the government what it would do if trouble were experienced. The government, like a court of law, refuses to decide a hypothetical case, upon which the American firm declares that since no support is forthcoming from the government, it can not do business.

The European supply firms evidently are depending upon the increase in customs from an effective 5 per cent to an effective $7\frac{1}{2}$ per cent agreed upon at the Washington Conference to go into effect some time next year, under conditions to be determined by a board appointed by the foreign powers.

This will make an annual increase in revenues estimated at fully \$50,000,000—sufficient to amortize all the outstanding unfunded indebtedness of China—including the so-called Nishihara loans—within 10 years. American suppliers should be watching this closely, else they may find other claims in advance of theirs.

America's Influence Slight Because of

Europe's Aggressive Loan Policy

Operating conditions in China offer many of the same problems as those originally found in America, and it would seem that American railway experience would offer the best field for study on the part of Chinese. Yet because of the aggressive loan policy of European nations American influence on Chinese railways is practically nil. Its only opportunity is through Chinese operating officers, the majority of whom are graduates of American technical colleges. Except for this incident of education, American influence would have no opportunity whatever. Out of the 6,200 miles of line in all China, British influence is exclusive on over 1,860, Franco-Belgian influence on 1,550, Russian on 1,050 and Japanese on 1,120. The agreements governing these loans puts officers of these nationalities in positions of administrative or advisory control and in most cases gives preference to materials of the contracting nationality.

At present, only one American is employed in any capacity in connection with the railways, and he is merely an adviser with special reference to accounts. Except for a struggle between the British and the Japanese with respect to the nationality of a successor, it is probable that he would have been replaced some time since. Until American finance par-

ticipates in the building of railways in China, there will be no opportunity for American railway men there, and only a struggling chance for American materials.

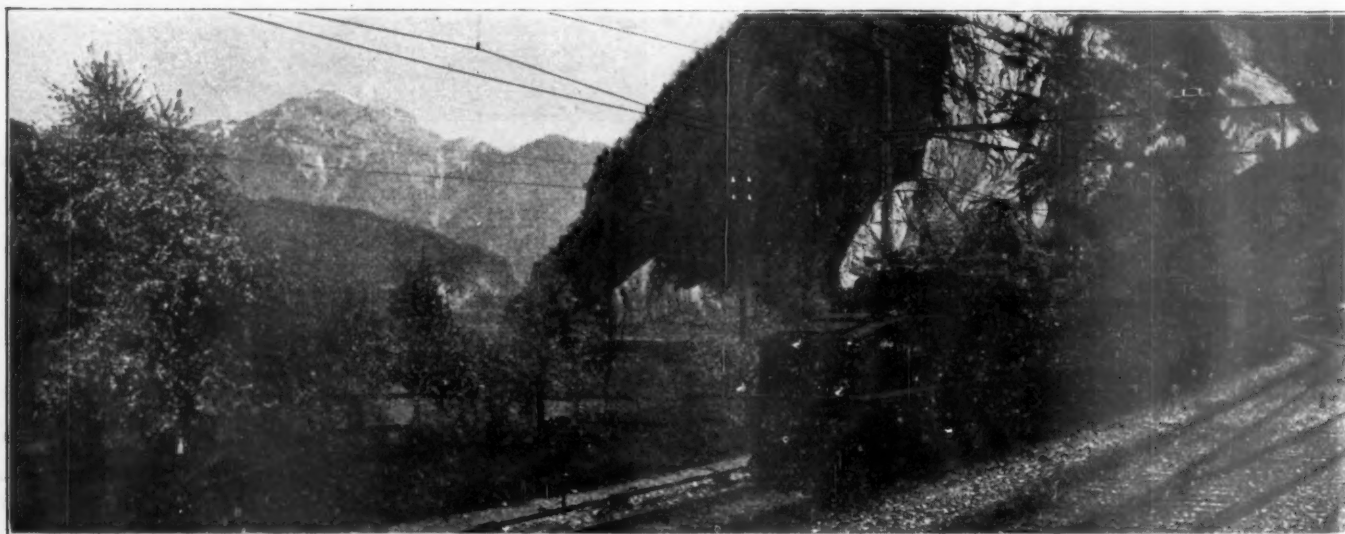
Railways Confined to Northeast Quarter

The railway system of China is practically confined to the northeastern quarter of the country. It is planned to be a continental system. The standard gage prevails, although two isolated lines of meter gage are present. Equipment is tending toward large capacity. All of the late orders for freight cars have been for 40 tons' capacity (ton=2,240 lb.). Consolidations, Mikados and Pacifics have been the favorite types of locomotives in late orders, but the weight has been lighter than on the standard lines in America for the reason that shorter freight trains are run. Due to the absence of air-brakes on freight cars and the type of car which does not permit of the application of many hand brakes in a train, no more cars are handled than the locomotive brake will control at moderate speeds. The average number of tons per train (long tons, net) has increased gradually from 227 in 1916 to 294 in 1920. The average haul has increased from 96 miles to 127 in the same time. Two-fifths of the freight tonnage consists of coal, agricultural and animal products making up another two-fifths.

Passenger Traffic

Passenger traffic has increased 33 per cent during the four years ending in 1920. Most of it is third-class, the accommodations being very simple. The average journey per passenger has increased from 42 to 56 miles, but the average is held down by the influence of short lines serving large cities. The average revenue per passenger, third-class, is only \$1.80 on the line with the highest average. Curiously, this is the oldest line rather than the longest. Train loads have increased from 200 to 253 passengers during the four years, 1916-1920.

The method of train operation is the "chef de gare" or token system. Preparations are being made to use a train controller, served by telephone on the Shanghai-Nanking line. The discipline is not sufficiently strong, and the means of safeguarding misunderstandings due to use of foreign languages with Chinese are not sufficient to make it safe to dispense with the token. Delays, however, can probably be cut down if immediate supervision is given to the use of the token.



A Freight Train on the St. Gotthard Railway, Switzerland

Statistical Section

An Analysis of the Railway Statistics for 1922
By Julius H. Parmelee

Construction Activities Improve During 1922

Receiverships and Foreclosure Sales During 1922

Locomotive Orders in 1922 Best Since 1918

Freight Car Orders Eight Times 1921 Figure

Passenger Car Orders Equal Four-Year Total

Dividend Charges on Railroad Stocks in 1922

Signal Construction Activities Show Improvement
By K. E. Kellenberger

Railroad Telegraph and Telephone Work
By J. H. Dunn

Chronological Review

An Analysis of the Railway Statistics for 1922

Increased Freight Traffic With Decline in Passenger Business—Net Income Greater Than in 1921

By Julius H. Parmelee

Director of the Bureau of Railway Economics

ONCE MORE have the railways of the United States experienced a year of abnormal conditions. Industrial disturbances upset any possibility of return to an even keel in 1922. Hardly had the depression of the year 1921 begun to fade away when the coal miners' strikes in the anthracite and bituminous fields descended on the country in April. This was followed in July by the first nation-

\$137,000,000 to \$4,460,000,000. As a consequence, expenses having been reduced and revenues increased—the net operating income for the year increased to \$760,000,000, compared with \$615,000,000 in 1921. Even with this increase, the rate of return earned by the railways on their property value as fixed by the Commission was only 4.05 per cent—far below the "fair return" set by the Commission at $5\frac{3}{4}$ per cent. The shortage under $5\frac{3}{4}$ per cent was \$320,000,000.

Financial Results

The total operating revenues of railways of Class I in 1922 approximated \$5,595,000,000, compared with \$5,563,000,000 in 1921. This was an increase of \$32,000,000, or 0.6 per cent. Compared with 1920, the year of largest gross earnings, the operating revenues of 1922 were less by \$630,000,000.

Operating expenses in 1922 amounted to \$4,460,000,000, which was a reduction of \$137,000,000 under 1921, or 3 per cent. As the expenses of 1921 were less than those of 1920 by \$1,233,000,000, it follows that the expenses of 1922 fell below those of 1920 by \$1,370,000,000.

Taxes, however, continued to increase. Nothing seems to stop them in their steady upward climb. They stood at \$300,000,000 in 1922, an increase of \$20,000,000 over 1921, or 7 per cent. The railway tax bill for 1922 was the greatest ever recorded, and for the first time crossed the \$300,000,000 mark.

The net operating income of \$760,000,000 was greater than in 1921 by \$145,000,000, or 24 per cent. The rate of 4.05 per cent on valuation compares with 3.3 per cent in 1921.

Table I presents these financial statistics in a condensed way. This table, like the others that follow, applies only to railways of Class I. All the entries for 1922 are in part the result of estimates, which will be subject to some revision when final returns for the year have been received and tabulated.

TABLE I

	1922	1921
Total operating revenues.....	\$5,595,000,000	\$5,563,000,000
Total operating expenses.....	4,460,000,000	4,597,000,000
Taxes	300,000,000	280,000,000
Net operating income.....	760,000,000	615,000,000

Operating Revenues

Railway operating revenues in 1922 were greater than for any year except 1920. From the beginning of the year freight rates were on a somewhat lower basis than that fixed by the Interstate Commerce Commission in 1920, due to rate adjustments made voluntarily by the railways or at the instance of the Commission. The freight business of the second half of the year 1922 moved under a basis of rates about 9 per cent below that of 1921. Passenger rates were not generally reduced, but the railways made more generous arrangements as to long distance travel, excursions, and the like, which slightly reduced the average receipts per passenger mile.

The resultant of heavier freight traffic carried on a lower rate basis was a freight revenue \$87,000,000, or 2 per cent greater than in 1921. Passenger revenue showed a decline of \$89,000,000, or 8 per cent. Express revenue increased 33

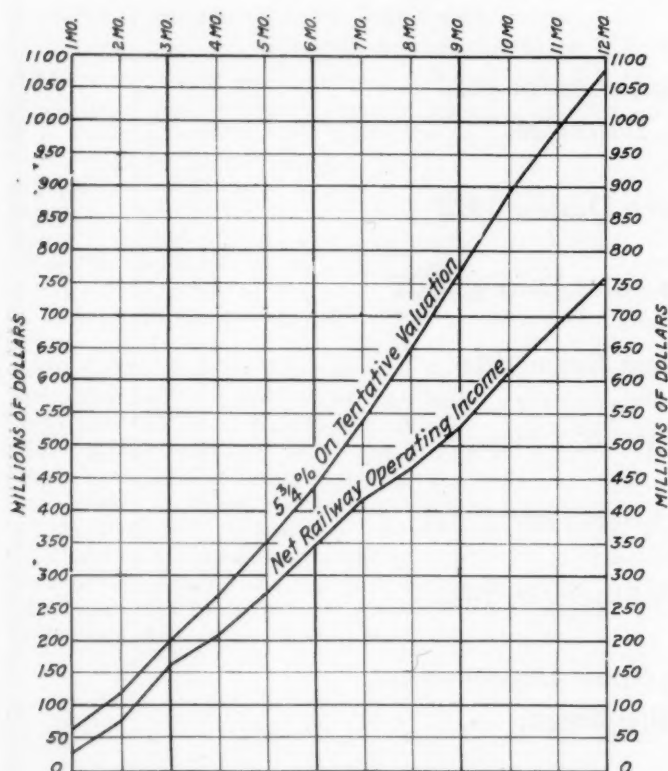


Chart A—Cumulative Net Railway Operating Income in 1922, Compared with $5\frac{3}{4}$ Per Cent on Valuation

wide strike of railway employees, namely, the strike of men employed in railway shops.

The coal strikes lasted until August and September, respectively, and the shopmen's strike until the middle of September, although there was no general settlement of the latter. After the temporary settlement of the miners' strike, but before the ill effects of the shopmen's strike could wear off, the railways were confronted with a record demand for transportation service. The last four months produced the greatest traffic movement ever handled in that season of the year.

The result of this heavy movement of the last four months was to make the freight traffic in 1922 $8\frac{1}{2}$ per cent greater than for the year 1921. Passenger traffic, however, declined to a point about 6 per cent below the low level reached in 1921.

Total revenues in 1922 were \$5,595,000,000, an increase of \$32,000,000 over 1921. Operating expenses declined

per cent. Mail and "all other" revenue showed a slight decrease.

Table II compares the revenues for 1922 with those for 1921, showing each of the principal sources of revenue separately.

TABLE II

	1922 (millions)	1921 (millions)
Freight revenue	\$4,005	\$3,918
Passenger revenue	1,065	1,154
Mail revenue	90	96
Express revenue	140	105
All other revenue	295	290
Total	\$5,595	\$5,563

The revenue returns by months were spotty, about half the months showing a decrease under the corresponding months of 1921, while the remaining months showed increases. The first effect of the coal strikes appeared in a decreased revenue for April, while the shopmen's strike helped to produce heavy declines in July and August.

Operating Expenses

It cost the railways \$4,460,000,000 to operate in 1922. This amount represents a decrease under 1921 of \$137,000,000, or 3 per cent.

Simultaneously with the July reduction in freight rates, the Railroad Labor Board ordered reductions in the wages of maintenance-of-way men, shopmen, and clerks, averaging about 10 per cent. Price levels were slightly lower than in 1921. In addition, the railways reduced their forces and instituted many other operating economies. These factors account for the reduction in operating expenses for the year.

Table III indicates the distribution of the operating expenses among the principal accounts.

TABLE III

	1922 (millions)	1921 (millions)
Maintenance-of-Way	\$730	\$763
Maint. of Equipment	1,270	1,254
Traffic	85	84
Transportation	2,175	2,286
General and other	200	210
Total	\$4,460	\$4,597

Owing to the shopmen's strike, and the heavy cost of making up the deferred maintenance resulting from it, maintenance of equipment expenses comprise the only large group of expenditures showing an increase in 1922. Maintenance-of-way and transportation expenses both decreased, the saving in transportation alone being as great as \$111,000,000, or about 5 per cent.

Operating expenses showed a decrease in every month to July, and an increase in every month thereafter. This increase resulted in part from the shopmen's strike, and in part from the heavy traffic of the last four months of the year.

Net Operating Income

From the point of view of the railway investor, the important element in railway finance is not the gross revenue but the net. Large revenues, if absorbed in great measure by large expenses, do not indicate a healthy state of affairs so much as a smaller revenue, with a relatively lower basis of expense. In the latter case, the net remains as high or higher than in the former. Railway operation is a business, and as in other forms of business the net must be guarded, or the business will fail. So long as our railways are privately owned and operated, and so long as private capital must finance railway progress, just so long must net railway income prove sufficient to repay the investor for his outlay. This is not only equity and common sense; it is sound law, and is written specifically into our fundamental regulatory law, the Transportation Act of 1920.

Railway net operating income amounted to \$760,000,000 in 1922. This was 4.05 per cent on the amount fixed in 1920 by the Interstate Commerce Commission as the value

of railway property, plus additional investment to the end of 1921. The "fair return" to which the railways are entitled under the Transportation Act is now $5\frac{3}{4}$ per cent. This rate was also fixed by the Commission, in its most recent rate decision.

How far short the railways fell of earning their "fair return" in 1922 is indicated by the difference between 4.05 and $5\frac{3}{4}$ per cent. In percentage terms the shortage was 1.70 per cent. In money, which is the real measure, the shortage amounted to \$320,000,000.

The rate of return by months, cumulated through the year is shown in Table IV.

TABLE IV

1922	Rate of return- per cent (Annual basis)
One month	2.75
Two months	3.69
Three months	4.61
Four months	4.45
Five months	4.45
Six months	4.53
Seven months	4.45
Eight months	4.16
Nine months	3.96
Ten months	3.97
Eleven months	4.00
Twelve months—the year	4.05

Chart A presents these figures in a graphic way. It clearly sets forth increasing spread between the net operating income actually earned, and what should have been earned to produce the "fair return."

Railway Traffic in 1922

Revenue carloadings showed an increase in 1922, compared with 1921, of about 10 per cent. This is the increase in number of cars actually loaded with freight and started on route. The average distance traveled per car, however, is not taken into account. To inject the factor of distance we must turn to ton-miles.

Net ton-miles (revenue and non-revenue freight) amounted to 374 billions in 1922, an increase of $8\frac{1}{2}$ per cent over 1921. Compared with 1920, however, they were less by 17 per cent. The freight traffic thus regained a part, but only a part, of the loss sustained in 1921. Much more would have been regained had it not been for the coal strikes.

At the same time that the freight was coming back, the passenger business continued to decline. All records for passenger service were broken in 1920. In 1921, passenger miles decreased more than 20 per cent. This was the greatest decline in the history of the railway passenger service, absolutely as well as relatively. In 1922 passenger miles declined nearly 6 per cent below 1921, and 25 per cent below 1920. This made the passenger business in 1922 lower than in any year since 1916.

The basic statistics underlying these statements as to traffic appear in Table V.

TABLE V

Carloadings	
1920	45,118,863
1921	39,324,967
1922	43,500,000
Net ton-miles	
1920	447,278,000,000
1921	340,759,000,000
1922	374,000,000,000
Passenger-miles	
1920	46,849,000,000
1921	37,313,000,000
1922	35,200,000,000

Tables VI and VII give the traffic results by months in 1922, so far as summarized to date, compared with 1921. Table VI relates to net ton-miles, and Table VII to passenger miles.

Ton-miles fell off in January, but were greater in February and March. The coal strike pulled them down again in April and May, and the shopmen's strike in July. Every other month in the year showed an increase over 1921, exceptionally heavy increases being shown in Novem-

ber and December. These two months showed an average increase of 30 per cent over 1921, which was one of the striking features of the year.

Passenger miles were less than 1921 for every month of the year except June, October, November and December. Here, too, the last of the year carried encouraging signs of an approach to more prosperous conditions.

Although the freight traffic as a whole showed a respectable increase, this increase was not uniform for all classes

in 1922. This reflects the unusually good crop year experienced in 1922, and speaks well for the efficiency displayed by the railways in moving bumper crops to market under adverse conditions. That there were delays and car shortages is indisputable, and certain sections suffered more than others, but viewed as a whole the performance of the railways with respect to this one class of traffic was excellent.

Merchandise and miscellaneous loadings attained their maximum in 1922. In fact, one of the outstanding traffic features of the year was the extent to which that class of traffic kept up, even during the period of the coal and shopmen's strikes. None of the other classes attained a record level, although all (except coal) were heavier than in 1921.

By contrast, coal traffic stood out as the one class of traffic showing a decline. This was the result of the coal strikes, whereby the amount of coal offered the railways for transportation declined, at the time when they could best have handled it, while the rush of coal onto the rails after September first so fully absorbed the available car supply that the deficiency could not be fully made up.

To get the pictures in complete detail, we must consider the year in three sections: The three months to March 31, preceding the coal strikes; the five months of the strikes, from April 1 to August 31; the final four months of the year, when every effort was bent toward evening up the coal supply.

In anticipation of the strikes, coal moved in great quantity during the first three months. This was particularly true in March. In these three months, the railways transported 527,000 more carloads of bituminous coal (including non-revenue movement) than during the corresponding period of 1921.

During the five months of the strike, however, the coal traffic fell off 1,144,000 cars. For the eight months as a whole, the net deficiency was thus 617,000 cars.

Entering the fall 617,000 cars behind, and confronted with the task both of meeting the usual autumn peak movement of coal and of making up the shortage so far experienced, the railways faced a serious problem. The question was what proportion could be made up before the first of the year. As early as October, railway officials predicted that they could cut the shortage in half. As it turned out, the railways in four months handled the normal fall movement, and 544,000 cars in addition, the shortage for the year being reduced to only 73,000 cars. This shortage should easily be met early in 1923.

The tragedy of the coal situation in 1922 lies in the fact that during the whole period of the coal strikes the railways had a large surplus of coal cars, and were ready to handle a much greater movement of coal than was offered. The surplusage was at one time as great as 235,000 coal cars, ready to move but idle for lack of traffic. That the railways so nearly caught up with the shortage in the last four months of 1922 is a really remarkable showing.

Passenger traffic was affected to an even greater extent by motor competition in 1922 than in 1921, and there seems little reason to expect any abatement of that competition. The country is being flooded with a record output of private and commercial passenger motor vehicles, with an effect on the railway passenger business that is no less than alarming. It is hard to see any positive cure for the situation, so far as the railways are concerned; the remedy seems to lie in a greater co-ordination of passenger-carrying agencies, under which the railways may be permitted so to modify their service as to relieve themselves of a requirement that in some respects has proven unremunerative.

Receipts per Traffic Unit

For the year as a whole, the average receipts per ton-mile and per passenger-mile were lower in 1922 than in 1921. The details by months appear in Table VIII.

Average receipts per passenger-mile were approximately

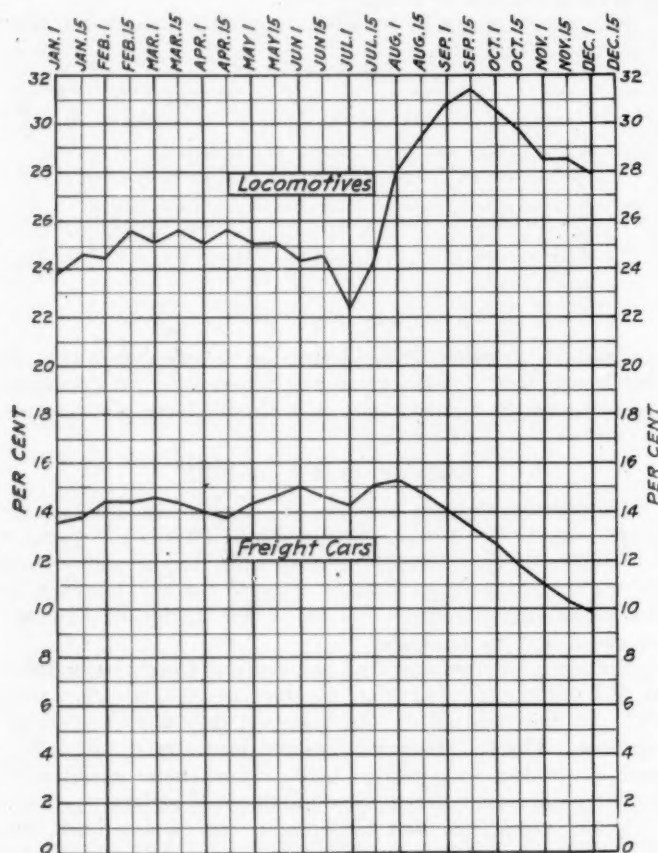


Chart B—Per Cent of Equipment in Need of Repairs—1922

of commodities. It is here that the effect of the coal strikes most clearly exhibits itself, for every class of traffic except coal increased.

TABLE VI
Net ton-miles (millions)

	1922	1921
January	27,099	29,784
February	28,344	24,915
March	32,895	26,816
April	24,723	25,591
May	27,918	28,220
June	29,049	28,146
July	27,071	28,402
August	30,452	30,420
September	34,271	30,864
October	39,260	36,507
November	39,744	29,138
December	32,570	25,706

TABLE VII
Revenue passenger-miles (millions)

	1922	1921
January	2,699	3,379
February	2,396	2,871
March	2,593	3,070
April	2,702	2,847
May	2,822	2,984
June	3,269	3,228
July	3,495	3,637
August	3,504	3,623
September	3,231	3,292
October	2,943	2,910
November	2,691	2,657
December	2,890	2,845

Grain loadings broke all records in 1922. Heavy as they were in 1920, the record was surpassed in 1921 and again

3.02 cents, compared with 3.088 cents in 1921, a decrease of about two per cent. This decrease resulted principally from concessions on the part of the railways, there being no change in the general level of passenger rates during the year 1922.

Freight rates, on the other hand, were subjected to considerable reduction. Not only did the process of rate adjustment which commenced in 1921 continue into 1922, but several general reductions also went into effect. From the first of the year the railways made a voluntary reduction of 10 per cent on agricultural products. Reductions in Western grain, grain products, hay, livestock, and lumber, some of which were effective late in 1921, also made their influence felt in 1922. Last of all, and most important, the Interstate Commerce Commission effected a general reduction of 10 per cent on July 1. So far as rates had already been reduced 10 per cent or more, they were not affected by this decision of the commission; all rates not yet down to 10 per cent below the 1920 level were reduced to that point. The net effect of all the changes was an average reduction of from 11 to 12 per cent under 1920.

TABLE VIII

	Average receipts per ton-mile (cents)		Average receipts per passenger-mile (cents)	
	1922	1921	1922	1921
January	1.164	1.215	3.102	3.114
February	1.152	1.274	3.071	3.081
March	1.198	1.320	3.105	3.169
April	1.291	1.316	3.088	3.182
May	1.271	1.236	3.031	3.134
June	1.249	1.261	2.935	3.087
July	1.209	1.234	2.876	2.987
August	1.168	1.280	2.891	3.006
September	1.120	1.271	3.013	3.070
October	1.143	1.261	3.048	3.056
November .....	.....	1.284	.....	3.107
December .....	.....	1.237	.....	3.118

Table VIII shows that the average receipts per passenger mile were slightly lower in every month of 1922 than for the corresponding months of 1921. Receipts per ton-mile were lower in every month save one—May—when the decline in coal traffic due to the strike tended to increase the average.

In fact, the coal strike greatly affected the average during those months when coal movement was below normal. This is indicated by the sudden jump in the average between March and April, from 1.198 cents to 1.291 cents. The average did not return to the March level or lower until August, when coal again began to move in quantity.

To eliminate this feature of the fluctuating coal movement, the average receipts per ton-mile may best be compared by semi-annual periods. During the first six months of 1922, the average was 1.220 cents, compared with 1.269 cents in the corresponding period of 1921. This was a decline of .049 cent, or about four per cent. During the second six-month period, after the general reduction of July 1, the average was 1.162 cents, compared with 1.277 cents in the same period of 1921. This was a decline of .115 cent, or about nine per cent. The effect of the general reduction of July 1 is here clearly seen.

Employees and Their Wages

Table IX shows the number of employees on the payrolls of railways of Class I, for each month of 1922 to September. Beginning at a level below that of 1921, the number increased to June, when it exceeded the corresponding number in 1921 by nearly 100,000 men. There was a sharp drop in July of 218,000, due to the shopmen's strike. In that month the number of men engaged in maintenance of equipment alone fell off 255,000. The total number rose gradually from that point. August showed an addition of 127,000 and September another 114,000. By September the number was again nearly even with 1921, and the remaining months of the year ran probably above 1921.

Total compensation in a general way paralleled the trend in number of employees, except that average earnings per man, due largely to increased overtime, were higher from

August on. The number of employees for the year averaged 1,619,000; their compensation approximated \$2,635,000,000; average annual compensation per man was about \$1,628. Compared with 1921, the number of men declined 2.5 per cent, the total compensation declined 5.9 per cent, and the average annual compensation about 3.4 per cent.

That the shopmen who went on strike on July 1 suffered from their venture is beyond question. They lost probably as much as \$100,000,000 in wages, and those that did go

TABLE IX
Number of Employees

	1922	1921
January	1,552,014	1,804,822
February	1,545,040	1,676,543
March	1,570,158	1,593,068
April	1,578,133	1,542,716
May	1,628,228	1,575,599
June	1,685,414	1,586,143
July	1,467,824	1,634,872
August	1,594,074	1,679,927
September	1,708,591	1,718,330
October .....	.....	1,754,136
November .....	.....	1,732,353
December .....	.....	1,637,151

back to work returned at the lower wage levels fixed for them by the Railroad Labor Board, against which their strike was largely directed. The question of seniority rights, which during the strike became, in some ways, the paramount issue, was largely left to mutual understanding between managements and men at the different points. On the whole, the strike may be fairly regarded as a disastrous venture for the men.

But the loss was not wholly that of the strikers. It cost the railways a large, although unknown, amount to employ new men, train them for their duties, overcome the temporary demoralization that necessarily followed the voluntary separation of many employees from the service, engage large extra forces of watchmen and guards, and finally to meet the losses from rioting, damage to property and goods, and the like.

Maintenance of equipment could not be kept up currently during the period of the strike, which called for a large additional expenditure to make up the deficiency in the later months of the year.

Chart B clearly portrays the effect of the shopmen's strike on the condition of locomotives and freight cars. The percentage of unserviceable locomotives remained at a fairly even level from January 1 to June 15. It dropped on July 1, and then climbed steadily to September 15, the date when the strike was informally settled. From September 15, the percentage declined steadily, although it had not by December 1 been reduced to the pre-strike level.

The effect on the condition of freight cars was not so marked, and the recovery since the strike has been greater. The percentage of cars in need of repairs on July 1 was slightly above that at the beginning of the year. It then rose to its peak on August 1, and from that point fell gradually to a considerably lower percentage than on January 1.

Finally, the burden of the shopmen's strike rested generally upon the shoulders of the public. No definite estimate can be made as to the final cost thrown by the strike onto the general public, but in the last analysis, the users of railway facilities must pay the added cost of the strike to the railways, and in addition must meet the losses entailed on industry by delays necessarily growing out of strike conditions.

A Forecast for 1923

During the last four months of 1922 railway traffic acquired a momentum that will carry well into 1923. This was especially true of coal, and to a degree also of merchandise and general traffic. Assuming no untoward industrial disturbances such as darkened the railway horizon in 1922—no renewal of the coal strike next April, for example

(Continued on page 157)



Grade Separation at Ampere, N. J., on Delaware, Lackawanna & Western

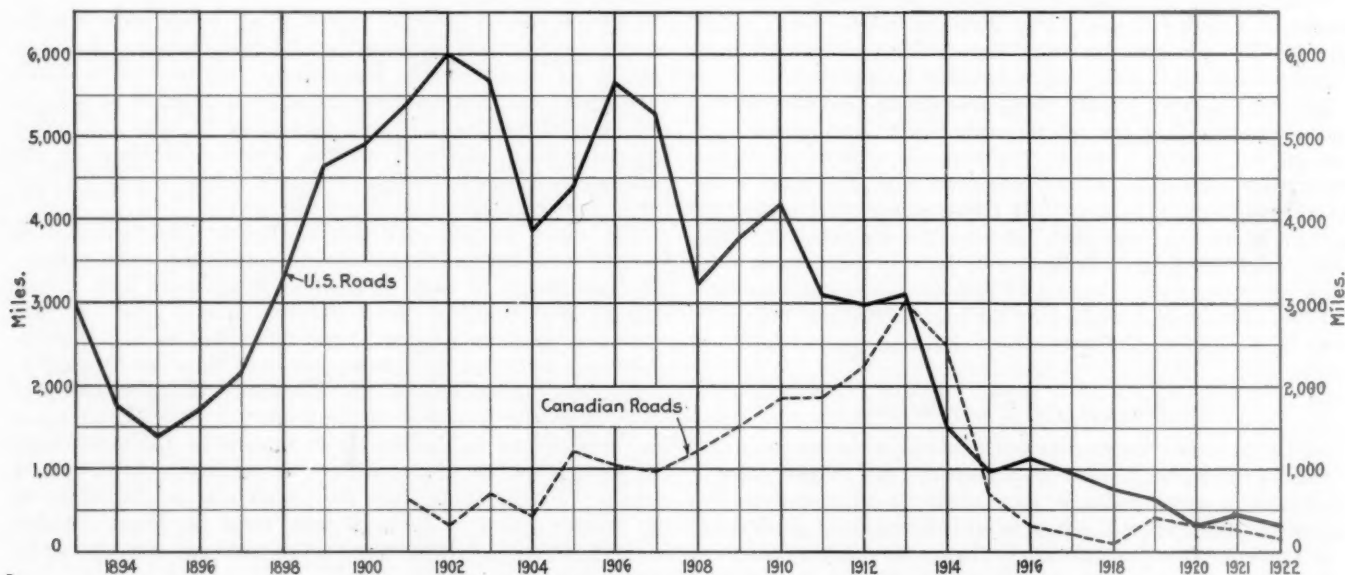
Construction Activities Improve During 1922

Better Conditions Evident Although Miles Abandoned Continue to Exceed New First Track

ALTHOUGH THE NUMBER of miles of new first track constructed during 1922 was near its record low, with the mileage of lines abandoned still in excess, a much healthier condition of railway construction was evidenced by the data received. Speaking generally, much of the work consisted of a resumption of many projects started at a time when

In contrast to this, 221.70 miles of first track were abandoned and taken up and 455.07 miles were abandoned and the track not taken up, or a total of 676.77 miles.

The total mileage (first, second, third and other multiple main track) was a slight decrease from the 1921 figure but some increase over 1920, reaching a total of 542.63 miles, of



Curves of Mileage Constructed in United States and Canada Since 1893

money was more plentiful and earnings were better. There was, nevertheless, a considerable amount of other work, such as new terminal and yard facilities and the reconstruction of other property, chiefly bridges, to correct inadequacies due to undermaintenance or obsolescence. During the year only 324.09 miles of first track were built, a low mark comparable to that of 1920 when only 313.71 miles were constructed.

which 195.97 miles and 17.57 miles were second and third track respectively. For 1921 the same figures were 642.22 miles for all track, of which 143.07 and 25.66 was second and third track respectively; and for 1920, 414.35 miles of all track and 90.87 and 1.89 miles of second and third. Second track construction thus shows a favorable increase over the preceding two years but much below that of 1919

and 1918, particularly the latter year, when approximately 650 miles of second track were built. While 195.97 miles of second track were built during 1922 there were also 19 miles abandoned, which reduces the net gain to about 175 miles.

Canadian mileage of new track still reflects the unsettled railroad condition of that country, there being but 144.50 miles of new first track and no multiple track built during the year. This is very close to the low record of 135 miles for 1918. Such building of new line as there was carried out was done by the Canadian Pacific in furthering the completion of some of the branch lines which it has had under

state, largely the work of the Illinois Central, having 15 miles of first track, 21.27 miles of second and 14.69 and 4.83 miles of third and fourth, respectively, or a total of 55.79 miles. California also had some second track work, consisting of 21.28 miles. The largest amount of second track laid was built by the Great Northern, 30.95 miles in the state of Washington and 11.55 miles in North Dakota.

Included in the California mileage are 17 miles of first track completed by the Minarets & Western, a new company, which in conjunction with an allied company, the Sugar Pine Lumber Company, is constructing a road 54.27 miles long.

NEW TRACK BUILT IN 1921

United States	Number companies building	Miles				Total
		First track	Second track	Third track	Fourth or more track	
Alaska	1	81.95	.....	.....	.....	81.95
Arkansas	4	13.59	2.00	.....	.....	15.59
California	4	5.27	1.19	.....	.....	6.46
Florida	4	59.90	.....	.....	.....	59.90
Georgia	2	4.80	.....	.....	.....	4.80
Hawaii	1	10.00	.....	.....	.....	10.00
Idaho	1	7.54	.....	.....	.....	7.54
Illinois	1	.....	3.30	.....	.....	3.30
Indiana	2	4.77	33.80	.....	.....	38.57
Kansas	2	0.75	9.65	.....	.....	10.40
Kentucky	3	1.57	5.50	10.60	.....	17.67
Louisiana	1	7.81	.....	.....	.....	7.81
Maryland	1	.....	2.30	.....	.....	2.30
Minnesota	1	3.00	.....	.....	.....	3.00
Mississippi	3	7.90	0.80	.....	.....	8.70
Missouri	4	4.09	8.77	0.06	0.11	13.03
Montana	1	.....	2.90	.....	.....	2.90
Nebraska	1	14.06	.....	.....	.....	14.06
New Jersey	1	1.90	.....	.....	.....	1.90
New York	1	.....	.....	13.30	.....	13.30
North Carolina	2	48.00	.....	.....	.....	48.00
Ohio	2	.....	8.85	0.95	0.68	10.48
Oklahoma	5	44.92	.....	.....	.....	44.92
Pennsylvania	3	5.52	.....	0.35	.....	5.87
Tennessee	1	6.00	.....	.....	.....	6.00
Texas	4	63.60	2.17	.....	.....	65.77
Utah	3	12.82	11.19	.....	.....	24.01
Washington	1	3.50	.....	.....	.....	3.50
West Virginia	5	44.90	21.52	.....	.....	66.42
Wyoming	1	16.94	29.13	.....	.....	46.07
Total	66	475.10	143.07	25.26	0.79	642.22
Canada	10	151.28	6.57	.....	.....	157.85

NEW TRACK BUILT IN 1922

United States	Number companies building	Miles				Total
		First track	Second track	Third track	Fourth or more track	
Alaska	1	8.12	.....	.....	.....	8.12
Alabama	1	7.30	.....	.....	.....	7.30
Arizona	1	.....	25.68	.....	.....	25.68
California	5	36.85	21.28	.....	.....	58.13
Idaho	1	7.46	17.67	.....	.....	25.13
Illinois	4	15.00	21.27	14.60	4.83	55.79
Indiana	2	.....	6.22	0.20	0.17	6.59
Kansas	3	70.74	12.80	.....	.....	83.54
Kentucky	4	2.58	16.23	.....	.....	18.81
Louisiana	3	20.25	.....	.....	.....	20.25
Michigan	3	3.27	2.51	.....	.....	5.78
Mississippi	1	9.50	.....	.....	.....	9.50
Missouri	1	.....	8.32	.....	.....	8.32
New Jersey	2	1.66	.....	2.68	.....	4.34
New York	1	2.00	.....	.....	.....	2.00
North Carolina	2	12.00	3.02	.....	.....	15.02
North Dakota	1	.....	11.55	.....	.....	11.55
Ohio	4	.....	15.58	.....	.....	15.58
Oklahoma	3	39.68	.....	.....	.....	39.68
Oregon	1	2.00	.....	.....	.....	2.00
Pennsylvania	4	6.52	0.23	.....	.....	6.75
Rhode Island	1	.....	0.23	.....	.....	0.23
Tennessee	2	10.50	1.01	.....	.....	11.51
Texas	1	13.00	.....	.....	.....	13.00
Utah	1	32.00	.....	.....	.....	32.00
Washington	1	.....	30.95	.....	.....	30.95
West Virginia	3	23.66	1.42	.....	.....	25.08
Total	57	324.09	195.97	17.57	5.00	542.63
Canada	5	144.50	.....	.....	.....	144.50

way for a number of years; and by the Temiskaming & Northern Ontario, which completed slightly over 44 miles of its new 70-mile extension north from Cochrane. This work, which is perhaps the only actual old-time colonization railway construction now going on, will probably be extended to Moose Factory on James Bay, about 110 miles north from the present contemplated end of the line. Much has been written in the past of the large mileage of the Canadian National, much of which traverses territory that in its present state of development, and probably for some time to come, is more than well served by railway trackage. Considering this, it is interesting to note that this system constructed only 1.48 miles of track in the past year.

The only state in which there was constructed any outstanding mileage was that of Kansas, within which there were built 70.74 miles of first track and 12.80 miles of second, or a total of 93.54 miles. In addition to that there are probably about 100 miles or more of new first track under construction in that state which probably will be completed in 1923. Incidentally, although not particularly pertinent to the statistics themselves, Kansas, Senator Capper, the farm bloc, and anti-railway agitation are, to many people, nearly synonymous or interchangeable. Therefore, in passing, it is perhaps not altogether unfair to point out that doubtless the railways in the West are doing far more to improve transportation and to further the development of Kansas than that state is doing for the railways.

The other states which had any mentionable mileage of first track alone were California with 36.85 miles, Oklahoma with 39.68 miles and Utah with 32 miles. Illinois contained more diversified track construction than any other

The Minarets & Western, which will be a common carrier, runs from Pinedale, Cal., to Crane Valley Dam, a distance of 47.69 miles, 9.24 miles being trackage rights over the Southern Pacific. The line of the allied company extends from Crane Valley Dam into the lumber holdings of that company in the Sierra National Forest. The work is of interest because of the very difficult and heavy construction which has been necessitated by the rough country traversed, the line surmounting a difference in elevation of 5,000 ft. between terminals. Aside from the 10.87 miles of the lumber company, which is purely a logging road with a maximum grade of 4.5 per cent, the ruling grade is 2.5 per cent compensated. In this respect it is worth pointing out that after leaving the Finegold drainage, which controls the grade for six miles, the line is continuous on its maximum gradient for 16 miles while surmounting the divide between the Finegold drainage and the drainage of the North Fork of the San Joaquin. On this stretch of maximum grade the line passes into five different drainages and crosses four summits without resorting to the use of tunnels, this probably being one of, if not the longest development on a continuous maximum grade on any existing railroad where tunnels have been avoided.

Construction other than track during the past year was, as might be expected, concerned chiefly with much needed improvement to speed up operation, terminal and otherwise, and to remedy many existing inadequacies due to under-maintenance or obsolescence. This is indicated most clearly in the large number of items on the replacement, strengthening or reconstruction of bridges, many of the roads carrying out a system program. Enginehouse, machine shops and

other terminal facilities, such as yard work and freight house construction, received considerable attention, followed by some grade separation, additional main tracks and grade and line revision. The greater proportion of the work was, as stated, confined chiefly to the comparative smaller projects, there being few really large undertakings started during the year.

The Castleton project which the New York Central has under way includes a long, high-level crossing of the Hudson

a much healthier railway construction year than the country has had for several years.

The short lines found "operation" fully as difficult in 1922 as in 1921, with the result that many of the roads which "carried on" through 1921 were forced to suspend last year. Some were abandoned and junked and others were abandoned and will be junked during 1923. A few, while abandoned so far as operation by the present companies is concerned, may be reconstructed and again put back in service; this was done with a number of the roads that ceased operation during 1921. However, from the data received, there is every indication that practically all of the mileage which is shown abandoned in one form or other will not be rebuilt, since many of the roads serve territories where timber was the only traffic and that is now gone.

The gradual weeding out of the unproductive lines is thus continuing, and it is not unreasonable to assume that it may continue for some years, for there yet remains many short lines, as well as branches of larger railroads, which serve sections of the country no longer producers of revenue freight nor likely to be for some decades to come. The mileage abandoned permanently and the track taken up for 1922 is about on a par with that for the past two years and about one-half or less than that for 1918 and 1919. Mileage abandoned and not taken up was about one-fourth of that for 1921, and in general somewhat less than the preceding three years, thus indicating a slightly better condition.

MILES OF NEW LINE COMPLETED IN THE UNITED STATES SINCE 1893

1893.....	3,024	1908.....	3,214
1894.....	1,760	1909.....	3,748
1895.....	1,420	1910.....	4,122
1896.....	1,692	1911.....	3,066
1897.....	2,109	1912.....	2,997
1898.....	3,265	1913.....	3,071
1899.....	4,569	1914.....	1,532
1900.....	4,894	1915.....	933
1901.....	5,368	1916.....	1,098
1902.....	6,026	1917.....	979
1903.....	5,652	1918.....	721
1904.....	3,832	1919.....	686
1905.....	4,388	1920.....	314
1906.....	5,623	1921.....	475
1907.....	5,212	1922.....	324

river, a large classification yard and new trackage, etc., involving an expenditure, when completed of about \$20,000,000. Work was also started on the new union passenger station at Cleveland, Ohio, and the Pittsburgh improvement program was resumed by the Pennsylvania. Taken as a whole, it was

	Lines abandoned permanently and taken up Miles	Lines abandoned and not taken up Miles		
United States			Mississippi Central—	
Bangor & Aroostook—			Hattiesburg, Miss., to Pines.....	14.0
End of East Millinocket Branch.....	0.75	....	Morenci Southern—	
Brownville Junction to Iron Works.....	8.85	....	In Arizona.....	18.00
Bryan, Brazos & Burleson—			New York, New Haven & Hartford—	
In Texas.....	27.4	....	Elmwood, Mass., to Westdale.....	0.67
Chesapeake & Ohio—			Pratts Junction, Mass., to Fitchburg.....	8.22
St. Albans, W. Va., to Ferrell.....	1.30	....	Saybrook, Conn., to Saybrook Junction.....	1.60
St. Albans, W. Va., to Ferrell.....	2.89	....	New York Central—	
Colorado & Southern—			Tonawanda, N. Y., to North Tonawanda.....	1.29
In Colorado, not specified.....	0.79	....	Norfolk Southern—	
Garos, Colo., to Macune.....	28.41	....	Pinehurst, N. C., to Carthage.....	12.23
Columbus & Greenville—			Ocala & Southwestern—	
Stoneville, Miss., to Percy.....	23.2	....	Ocala, Fla., to Ray.....	6.0
Minter City, Miss., to Webb.....	15.3	....	Oberlin, Hampton & Eastern—	
Itta Bena, Miss., to Minter City.....	19.3	....	In Louisiana.....	9.80
Crittendon Railway—			Patterson & Western—	
Earl, Ark., to Timberland.....	6.50	....	In California.....	23.6
Dayton, Toledo & Chicago—			Pere Marquette—	
Delphos, Ohio, to Dayton.....	90.0	....	Harrison, Mich., to Leota.....	9.43
Duluth & Northern Minnesota—			Pennsylvania—	
Knife River, Minn., to Cascade.....	99.25	....	Brandywine Summit, Pa., to National:	
Fort Smith, Poteau & Western—			Kaslin Works.....	1.63
In Oklahoma.....	4.00	....	Near Glen Campbell Junction, Pa.....	0.21
Great Northern—			Philadelphia & Reading—	
Northport, Wash., to International Boundry.....	7.49	....	Near Greenbach, Pa.....	0.40
Gladys & Alpena—			Near Silverbrook, Pa.....	1.08
Gladwin, W. Va., to Evenwood.....	18.00	....	Rome & Northern—	
Kinder & Northwestern—			In Georgia.....	18.70
Kinder, La., to Bullard.....	14.00	....	Silverton Railway—	
Kentwood & Eastern—			Joker Tunnel, Colo., to Genesee.....	3.0
Kentwood, La., to Scanlon.....	16.53	....	Genesee, Colo., to Silverton.....	12.50
Leetonia Railway—			Spokane & British Columbia—	
Tioga County, Pa.....	8.70	....	In Washington.....	36.30
Liberty-White—			Southern Pacific—	
Liberty, Miss., to South Maccomb.....	24.20	....	In Houston, Tex.....	1.20
Live Oak, Perry & Gulf—			West Virginia & Midland—	
Murat Junction, Fla., to Murat.....	3.74	....	Moats, W. Va., to Marpleton.....	3.5
Loughridge, Fla., to Mile Post 62.....	2.10	....	Willacoochee & Du Pont—	
Los Angeles & Salt Lake—			In Georgia.....	10.00
Boulter, Utah, to Mile Post 37.....	6.48	....	Zwolle & Eastern—	
Madison Southern—			In Louisiana.....	10.0
Madison, Fla., to Waco.....	22.0	....	Totals.....	221.70 455.07
Marion & Southern—				
West Marion, S. C., to Brownsville.....	17.0	....	Great Northern—	
Minneapolis, St. Paul & Sault Ste. Marie—			Devil's Lake, N. D., to Church Ferry.....	19.05
Ironhub, Minn., to Deerwood.....	3.90	....	
Minneapolis & St. Louis—			Canada	
Kalo, Iowa, and Kalo Junction.....	1.33	....	Alberta & Great Waterways—	
			In Alberta.....	3.2

Railroad Construction in the United States in 1922

Alaska Railroad

First Track: Nenana, Alaska, to North Nenana, 8.12 miles.

Other Important Work Under Construction: This railroad is still under construction. Detailed items of work accomplished during year are not available. In general, they may be listed as surfacing and ballasting about 70 miles of track; erection of piers, approaches, etc., for large steel bridge at Mile 412, over Tanana river, preparatory to erection of steel; the erection of a combination depot-hotel at Curry (Mile 249); roundhouse at same point; extension of machine shop at Anchorage to double its size; erection of new power house at Anchorage.

Alton & Southern

First Track: East St. Louis, Ill., to Granite City, 15 miles.

Other important Work Under Construction: Building new line from Granite City, Ill., to Mitchell, 4 miles.

Ann Arbor

Second Track: Alexis, Ohio, to Toledo, 5 miles.

Other Important Work Under Construction: Double tracking at Toledo, Ohio, including the revision of yard tracks and signals, etc., cost \$600,000 (60 per cent completed).

Atchison, Topeka & Santa Fe

First Track: Owen, Okla., to Pawhuska, 29 miles. Eldorado, Kan., to North Eldorado, 1.74 miles. Satanta, Kan., to Mantor, 54 miles.

Second Track: In Arizona, 25.68 miles.

Other Important Work Under Construction: New line under construction from near Pawhuska, Okla., to Pawhuska, 6.3 miles, to be completed early in 1923. New line from north of Eldorado, Kan., to Ellinor, 47.6 miles, to be completed in the fall of 1923. Reinforced concrete and brick freight house at Dallas, Tex., cost \$220,000. New boiler shop at Albuquerque, N. M., cost \$400,000. New concrete passenger station at Phoenix, Ariz., cost \$500,000.

Atlantic City Railroad

Third Track: Haddon Heights, N. J., to Magnolia, 2.68 miles.

Atlantic Coast Line

Other Important Work Under Construction: New 25-stall engine house and 100-ft. turntable at Southover, near Savannah, Ga., cost \$140,000 (completed).

Baltimore & Ohio

Other Important Work Under Construction: Grading proposed yard development at Arlington, Staten Island, N. Y., cost \$330,000 (65 per cent completed). Building two joint industrial tracks at Philadelphia, Pa., cost \$260,000 (65 per cent completed). Track elevation at Philadelphia, Pa., initial appropriation \$1,000,000 (30 per cent completed). Extension of third and siding tracks at Bay View Junction, Md., cost \$113,000 (50 per cent completed). Building fireproof warehouse at Philadelphia, cost \$500,000 (completed). Grade separation at Lumbrook, Del., cost \$100,000 (Completed). Reconstruction of bridges at Savage and College, Md., cost \$118,000 (completed). Engine terminal improvements at Washington, D. C., cost \$187,000 (60 per cent completed). Rebuilding bridge at Laughlin Junction, Pa., cost \$150,000 (80 per cent completed). Rebuilding bridges from Millvale to New Castle Junction, Pa., cost \$250,000 (completed). Extension of bridge at Gary, Ind., cost \$125,000 (30 per cent completed). Reconstruction of bridges from Webster to Parkersburg, W. Va., cost \$335,000 (completed). Relining tunnel at Sago, W. Va., cost \$100,780 (completed). Reconstruction of bridges at Clokey and Washington, Pa., cost \$117,000 (completed). Reconstruction of bridges from West Alexander to Elm Grove, W. Va., cost \$126,000 (completed). Reconstruction of bridge at Cummingsville, Ohio, cost \$183,000 (completed). Extension of Summit street and straightening of Swan Creek channel at Toledo, Ohio, cost \$110,000 (completed).

Bastrop & Lake Providence

First Track: Burlap, La., to Mer Rouge, 9 miles.

Belt Railway of Chicago

Other Important Work Under Construction: Artificial ice plant at Clearing yard, capacity 350 tons per day; and icing platform, capacity 250 cars per day (completed).

Bessemer & Lake Erie

Other Important Work Under Construction: Conversion of Culmerville tunnel into an open cut with relocation of highways and highway bridge over new cut at Culmerville, Pa., cost \$300,000 (completed).

Central Railway of Arkansas

Other Important Work Under Construction: New line under project from Plainview, Ark., to Bluffton, 23 miles.

Central of Georgia

First Track: McCombs, Ala., to Overton, 7.30 miles.

Central Railroad of New Jersey

First Track: In New Jersey, on Deerfield branch, 1.66 miles. In Pennsylvania, from main line to Cary Printing Company, 1 mile.

Other Important Work Under Construction: Renewal of bridge No. 58 and other work at Mauch Chunk, Pa., cost \$761,000 (33 per cent completed).

Chesapeake & Ohio

First Track: St. Albans, W. Va., to Ferrell, 3.66 miles. Wylo, W. Va., to end of line, 3.27 miles.

Chicago & Alton

Second Track: Brighton, Ill., to Godfrey, 7 miles.

Other Important Work Under Construction: Construction of new line from Titus, Ill., to Nutwood, 7.5 miles; and from Titus, Ill., to Hardin, 1.9 miles.

Chicago, Burlington & Quincy

Second Track: Walshville, Ill., to Sorento, 5.84 miles; Waltonville, Ill., to Sesser, 8.43 miles.

Other Important Work Under Construction: Realignment and elevation of main tracks through Aurora, Ill., to abolish 16 grade crossings; the construction of new passenger and freight depots, the rearrangement of freight yards and the construction of additional yard tracks, cost \$5,000,000 (75 per cent completed). New reservoir near Galesburg, Ill., capacity 900,000,000 gal., cost \$345,000 (50 per cent completed). New shops at Denver, Col., cost \$2,300,000 (25 per cent completed). Twelve miles of track for beet collecting, Hardin, Mont., cost \$203,000 (90 per cent completed).

Chicago, Milwaukee & St. Paul

Other Important Work Under Construction: Additional work on track elevation between Irving Park Boulevard and Howard street, Chicago, Ill., on Chicago & Evanston division, consisting of completion of remaining bridge floors, etc., cost \$700,000 (90 per cent completed).

Chicago, Indianapolis & Louisville

Other Important Work Under Construction: Elevation of freight house yard, team tracks, etc., in the vicinity of New Jersey street, Indianapolis, Ind., cost \$500,000 (8 per cent completed).

Christie & Eastern

First Track: Peason, La., to Red River & Gulf Junction, 5 miles. (Built in 1922 by Peavy-Wilson Lumber Company and leased to above road for operation as common carrier.)

Cleveland, Cincinnati, Chicago & St. Louis

Second Track: Cleveland, Ohio, to Springfield, 4.56 miles. Templeton, Ind., to Illinois State Line, 6.22 miles.

Other Important Work Under Construction: New 5-stall engine terminal at Sheff, Ind., cost \$200,000 (completed). New 6-stall engine terminal at Ansonia, Ohio, cost \$170,000 (completed). Elimination of grade crossings at Indianapolis, Ind., cost \$1,700,000 (76 per cent completed). New three-story R. R. Y. M. C. A. building at Bellefontaine, Ohio, cost \$100,000 (35 per cent completed). White River bridge at Plummer, Ind., cost \$220,000 (95 per cent completed). Wabash river bridge at Covington, Ind., cost \$175,000. Vermilion River viaduct at Danville, Ill., cost \$275,000. Delaware cut-off under construction, vicinity of Delaware, Md., 3.5 miles. New cut-off under project at Sidney, Ohio, 6.5 miles.

Clinton & Oklahoma Western

First Track: In Oklahoma, 0.28 miles.

Columbia & Nehalem River

First Track: In Oregon, between Mile Posts 30.4 and 32.4, 2 miles.

Delaware, Lackawanna & Western

Other Important Work Under Construction: Improvements at East Orange, N. J., cost \$4,200,000 (75 per cent completed). Grade crossing elimination work and construction of subway at E. Delaware avenue and viaduct at Kensington Avenue, Buffalo, N. Y., cost \$350,000 (30 per cent completed).

Denver & Rio Grande Western

Other Important Work Under Construction: New power plant at Denver, Colo., cost \$114,600 (completed). Replacing 41,560 yd. of riprap and placing 27,425 yd. additional from Pueblo, Colo., to Echo, cost \$161,800 (completed). Erection of 50 additional frame cottages for living quarters at Soldier Summit, Utah, cost \$200,000 (60 per cent completed).

Florida East Coast

Other Important Work Under Construction: File storage building, boiler house and general office building, Unit No. 1, at St. Augustine, Fla., cost \$190,000 (completed). General office building, Unit No. 2, same location, cost \$170,000 (5 per cent completed). New line under survey from Okeechobee, Fla., to Miami, 122 miles.

Genesee & Wyoming

Other Important Work Under Construction: New storage and classification yards at Retsof, N. Y., cost \$200,000 (95 per cent completed).

Georgia & Florida

Other Important Work Under Construction: Reduction of grades and curvature, relocation of part of line, and elimination of wooden trestles from Brushy Creek, Ga., to DeBruce, cost \$232,810 (80 per cent completed).

Great Northern

Second Track: In Washington, at Spokane, 1.11 miles. Bluestem, Wash., to Lamona, 22.4 miles. Dean, Wash., to Hillyard, 7.44 miles. Spring Brook, N. D., to Williston, 11.55 miles.

Other Important Work Under Construction: Reinforcing Bridge 10 at St. Cloud, Minn., cost \$126,000 (95 per cent completed). Replacing timber ore dock No. 2 with concrete and steel dock at Allouez, Wis., cost \$2,605,000 (30 per cent completed). New engine terminal at Minneapolis Junction, Minn., cost \$647,400 (90 per cent completed). Terminal yard and engine facilities at Wenatchee, Wash., cost \$1,001,400 (95 per cent completed). New engine house, store buildings, tracks, etc., at Skykomis, Wash., cost \$165,900 (80 per cent completed).

Gulf & Ship Island

Other Important Work Under Construction: New concrete, brick and steel-frame machine shop, engine house, boiler shop, blacksmith shop and cinder conveyor, cost \$225,000 (75 per cent completed).

Gulf Ports Terminal Railway

Other Important Work Under Construction: New line under construction from Pemonia, Ala., to Mobile, 24.7 miles.

Houston & Brazos Valley

First Track: Hoskins Junction, Tex., to Hoskins Mound, 13 miles.

Illinois Central

Second Track: Scottsburg, Ky., to Princeton, 4.58 miles. Eddyville, Ky., to Kuttawa, 0.80 miles. Paducah, Ky., to Clarks, 2.73 miles.

Third Track: Matteson, Ill., to Peotone, 10.13 miles. Tucker, Ill., to Kankakee, 4.56 miles.

Fourth Track: Matteson, Ill., to Monee, 4.83 miles.

Other Important Work Under Construction: New yards, shops and engine terminal facilities at Homewood, Ill., cost \$8,200,000 (30 per cent completed). Grade revision at Chicago, Ill., a part of the electrification project, cost \$3,621,000 (10 per cent completed). New track at Louisville, Ky., for Standard Oil Company, cost \$102,000 (completed). Building 3.67 miles of track to Bell Coal & Navigation Company's mine near Sturgis, Ky., cost \$144,000 (completed). Renewal of bridge near Obion, Tenn., cost \$145,000 (completed). New icing facilities at Centralia, Ill., cost \$142,000 (completed). Building coal mine track near Central City, Ky., cost \$158,000 (completed). Concrete viaduct at Memphis Tenn., cost \$83,000 (completed). Extension of Nonconah yard near Memphis, cost \$360,000 (completed). Extension of yard tracks and yard facilities at Paducah, Ky., cost \$809,000 (completed). Construction of coal mine track near Providence, Ky., cost \$117,000 (completed).

Indiana Harbor Belt

Other Important Work Under Construction: Extension of east and west-bound passing tracks, rearrangement of wye connection and of team tracks at La Grange, Ill., cost \$110,000 (85 per cent completed).

Indianapolis Union Railway

Third Track: In Indianapolis, Ind., from East street to Noble street, 0.20 miles.

Fourth Track: In Indianapolis, Ind., from East street to Noble street, 0.17 miles.

Other Important Work Under Construction: Track elevation, at Indianapolis, cost \$10,000,000 (completed).

Jackson & Eastern

First Track: Sebastopol, Miss., to Walnut Grove, 9.5 miles.

Other Important Work Under Construction: Building new line from Walnut Grove, Miss., to Jackson, 50 miles.

Kanawha & Michigan

Second Track: Hobson, Ohio, to Meigs, 5.47 miles.

Kanawha, Glen Jean & Eastern

Other Important Work Under Construction: Building new line from Oswald, W. Va., to Buck Knob, 0.25 miles.

Kansas & Oklahoma

First Track: Liberal, Kan., to Woods, 15 miles.

Other Important Work Under Construction: New lines under construction from Woods, Kan., to Hughton, 14 miles, and from Liberal, Kan., to Forgan, Okla., 25 miles. New line under survey from Forgan, Okla., to Elmore, Colo., 240 miles.

Kansas City, Ft. Scott & Memphis

Second Track: Springfield, Kan., to Paola, 12.80 miles.

Kansas City Southern

Other Important Work Under Construction: Improvements to power plant at Pittsburg, Kan., including a 500-kw. direct-connected, engine-driven generator, a 3,000-cu. ft. air compressor, a 350-hp. water tube boiler, and equipment for coal handling, crushing and pulverizing, etc., cost \$165,000 (75 per cent completed).

Kentucky & Tennessee

First Track: In Kentucky, 2.58 miles.

Other Important Work Under Construction: Building new line from present terminal to Bell Farm, Ky., 2 miles.

Knoxville & Carolina

Other Important Work Under Construction: Improvements to road and elimination of wooden trestles by replacement with concrete and steel or by filling in, cost \$100,000 (50 per cent completed).

Lake Superior & Ishpeming

Other Important Work Under Construction: Fireproof building, 500 ft. long, divided into a car repair shop, coach shop and paint shop, at Marquette, Mich., cost \$250,000 (5 per cent completed).

Lehigh Valley

Other Important Work Under Construction: First unit of a new rail and deep-water terminal, also dredging a 35-ft. channel to deep water at Claremont, Jersey City, N. J., and the building of a two-story steel frame hollow-tile, concrete freight house, 127 ft. long, for handling freight, cost \$5,000,000 (90 per cent completed).

Los Angeles & Salt Lake

First Track: Delta, Utah, to Fillmore, 32 miles. Whittier, Calif., to Anaheim, 17 miles.

Other Important Work Under Construction: New line under project from Lund, Utah, to Cedar City, 33 miles. New freight terminal at Los Angeles, Calif., cost \$1,180,000 (completed). New freight terminal at Long Beach, Calif., cost \$210,000 (completed). New station and hotel building at Caliente, Nev., cost \$120,000 (completed). Building flood protection from Guelph, Nev., to Barclay, cost \$250,000 (completed). Building classification yard and industrial site at Los Angeles, cost \$1,290,000 (35 per cent completed).

Louisiana & Arkansas

Other Important Work Under Construction: New shops at Minden, La., cost \$400,000.

Louisiana Railway & Navigation

Other Important Work Under Construction: Widening 175 miles of roadway from Shreveport, La., to Naples, cost \$180,000 (25 per cent completed). Gravel washing plant at Colfax, La., cost \$100,000 (90 per cent completed). Building engine house and car repair buildings at Pineville, La., cost \$300,000 (20 per cent completed). Building engine house and machine shops at New Orleans, La., cost \$150,000 (10 per cent completed).

Louisville & Nashville

Second Track: Millers Creek, Ky., to Pryse, 2.50 miles. Arkle, Ky., to Baileys, 5.37 miles.

Other Important Work Under Construction: Construction of second track between Mile Posts 224.8 and 237.2 and construction of new single-track tunnels and one single-track bridge across the north fork of the Kentucky river, cost \$1,500,000 (2 per cent completed). Construction of second track between Mile Posts 185.2 and 202 and grade reduction from Baileys, Ky., to Wallsend, \$1,800,000. North-bound yard and rearrangement of tracks at Ravenna, Ky., cost \$422,000. Yard and mechanical facilities at Loyal, Ky., cost \$746,000 (completed). Storage yard near Typo, Ky., cost \$453,000 (completed). Engine house, machine shops and other buildings at Loyal, Ky., cost \$464,000 (completed). New freight station at Knoxville, Tenn., cost \$220,860. Building second track through Hazard, Ky., extension

and rearrangement of freight facilities and building new passenger station, cost \$158,000 (completed). New single track bridge 30 miles from New Orleans, La., cost \$3,128,000.

Magma Arizona

Other Important Work Under Construction: Building 15 miles of standard gage railroad across desert, 15 miles of main line through mountainous country and 4 miles of spurs, sidings and yards from Magma, Ariz., to Superior (60 per cent completed).

McClellanville & Santac

Other Important Work Under Construction: New line under construction from McClellanville, S. C., to Jamestown, 20 miles.

Michigan Central

Other Important Work Under Construction: New eastbound receiving yard at Niles, Mich., cost \$325,000 (completed). Westbound classification yard and incidental improvements at Niles, cost \$1,115,000 (25 per cent completed). New steel arch bridge at Niagara Falls, cost \$2,000,000 (work not started).

Minaret & Western

First Track: Pinedale, Cal., to Bellview, 17 miles.

Other Important Work Under Construction: Building new line from Friant, Cal., to Central Camp, a logging road operated as a common carrier, with a ruling grade of 2.5 per cent compensated, through very rough country, and into the Sierra National Forest from the San Joaquin Valley, 49.65 miles, cost \$3,000,000 (including 17 miles completed), 45 per cent completed.

Missouri, Kansas & Texas

Other Important Work Under Construction: One-story freight station at Oklahoma City, Okla., cost \$126,000 (completed). Extension of freight cut-off at Denison, Tex., cost \$109,000 (95 per cent completed). New freight terminal and hump yard at Denison, cost \$3,200,000 (50 per cent completed). Locomotive repair shop at Waco, Tex., cost \$1,500,000 (25 per cent completed). New freight station at Waco, cost \$180,000 (80 per cent completed). New freight house at Wichita Falls, Tex., cost \$135,000 (completed).

Missouri Pacific

Other Important Work Under Construction: Water reservoir and pumping plant, etc., at Holsington, Kan., cost \$300,000 (completed). Filling in high timber trestle on White River division, cost \$400,000 (25 per cent completed). Track raise and trestle construction at Crning, Ark., cost \$250,000 (15 per cent completed). Raising and extending Bridge 1 at Kansas City, Kan., cost \$175,000 (25 per cent completed). Renewal of Bridge 31 at Osage, Mo., cost \$228,000 (10 per cent completed). Improvement in Bridge 100 at Parkin, Ark., cost \$140,000 (90 per cent completed). Strengthening bridges on system generally, cost \$1,203,000 (5 per cent completed). Installation of boiler washing facilities at various points on system, cost \$138,000 (10 per cent completed).

Montana Southern

Other Important Work Under Construction: New line under project from Allentown, Mont., to Jackson, 65 miles.

Moshassuck Valley

Second Track: At Woodlawn Junction, R. I., 0.23 miles.

Muskegon Railway & Navigation

First Track: In Michigan, 1.5 miles.

Nashville & Atlantic

First Track: Campaign, Tenn., to Rocky river, 10.5 miles.

Nashville, Chattanooga & St. Louis

Other Important Work Under Construction: Improvement and change of line, including two new deck-plate-girder bridges on Nashville division from near Mile Post 22 to near Mile Post 24, cost \$168,000 (completed). New engine terminal and improved passenger and freight facilities at Hollow Rock Junction, Tenn., cost \$580,000 (completed).

Natchez, Urania & Ruston

First Track: Olla, La., to McCartney spur, 6.25 miles.

New York & Long Branch

Other Important Work Under Construction: New passenger station at Asbury Park, N. J., cost \$125,000 (90 per cent completed).

New York Central

First Track: Tonawanda, N. Y., to North Tonawanda, 2 miles.

Other Important Work Under Construction: Rebuilding of bridge at Pier D, North River, \$200,000 (20 per cent completed). Installation of one 1,500-kw. and one 500-kw. direct-current, turbo-generator at 50th street service plant, New York City, cost \$122,000 (90 per cent completed). Remote control sub-station at 110th street, New York City, cost \$265,000 (80 per cent completed). Reconstruction of street bridge over Harlem division tracks, cost \$216,000 (60 per cent completed). Double-track, open-cut detour at Garrison, N. Y., cost \$600,000 (50 per cent completed). Reconstruction of floor, sub-structure and new office building at East Buffalo, cost \$145,000 (90 per cent completed). New line around Tonawanda, N. Y., cost \$177,000 (90 per cent completed). Stores, offices and show rooms, New York City, cost \$3,600,000 (75 per cent completed). Installation of 20,000-kw. turbo-generator at Port Morris, N. Y., cost \$881,500 (99 per cent completed). New coal trestle at Belle Isle, N. Y., cost \$168,000 (89 per cent completed). Replacing Bridge 751-A at Depew, N. Y., cost \$125,000 (completed). High-level crossing at Castleton, N. Y., cost \$17,000,000 (20 per cent completed). Third and fourth tracking on Syracuse Junction branch, cost \$460,000 (88 per cent completed). Grade separation at Erie, Pa., cost \$450,000 (30 per cent completed). Track elevation through Elyria, Ohio, cost \$1,100,000 (30 per cent completed). Grade separation at Toledo, Ohio,

cost \$370,000 (7 per cent completed). Steel and concrete viaduct at Youngstown, Ohio, cost \$627,000 (95 per cent completed).

New York, Chicago & St. Louis

Other Important Work Under Construction: Four-track depression for the elimination of grade crossings at Cleveland, Ohio, including the building of 12 overhead highway bridges and six foot bridges, cost \$4,500,000 (90 per cent completed).

New York, New Haven, & Hartford

Other Important Work Under Construction: Revisioning of track at Worcester, Mass., cost \$200,000 (completed). Lowering main line and yard tracks, revamping of bulk and coach yard and replacing of driveways with concrete at Springfield, Mass., cost \$365,500 (66 per cent completed). Steel girder bridge at Capitol Avenue, Hartford, Conn., cost \$212,000. Rearrangement of classification yard and extension of branch switch yard at Hartford, Conn., cost \$132,403 (90 per cent completed). Construction of 10,444 ft. of track to connect east end of track at Westerly, R. I., with west end of track at Bradford, R. I., cost \$120,000 (completed).

Norfolk Southern

Other Important Work Under Construction: Grade and line revision at various points along the line, cost \$400,000 (completed).

Northern Pacific Terminal of Oregon

Other Important Work Under Construction: New 1,200,000 cu. yd. hydraulic fill, 8-stall brick and tile enginehouse, cinder pit, turntable, water station, oil fuel station and various other buildings constructed at Guild's Lake freight yard, cost \$400,000 (completed). New steel umbrella shed, concrete team platform, auto unloading platform and additional trackage at passenger yard, cost \$100,000 (completed).

Oklahoma & Arkansas

First Track: Saline Junction, Okla., to Day, 20 miles.

Oregon Short Line

First Track: Homedale, Ida., to Erb, 7.46 miles.

Second Track: From King Hill, Ida., to Hammett, 17.67 miles.

Other Important Work Under Construction: Additions to storehouse and changes in present buildings at Pocatello, Ida., cost \$153,000 (10 per cent completed). Extension to steel car shop at Pocatello, cost \$130,000 (90 per cent completed). Installing 15-ton, 85-ft. span traveling crane in store yard at Pocatello, cost \$100,000 (90 per cent completed). Reservoir of 2,200,000 gal. capacity at Batise Springs, Ida., cost \$100,000 (50 per cent completed). New yard tracks, moving stock yard and rearranging facilities, at Nampa, Ida., cost \$125,000 (90 per cent completed).

Oregon-Washington Railroad & Navigation

Other Important Work Under Construction: New wood preserving plant and storage yard at The Dalles, Ore., cost \$464,942 (41 per cent completed). Enlarging single-track, timber-lined tunnel to double track tunnel and lining with concrete at Corbett, Ore., cost \$175,900 (32 per cent completed). Enlarging single-track, timber-lined tunnel to double track and lining with concrete at Mosier, Ore., cost \$108,568 (completed). New steel bridge over Yakima river and relocation of tracks at east end, cost \$264,066 (60 per cent completed). New substructure and replacing present substructure, of Bridge 7, near Kelan, Wash., cost \$613,697 (35 per cent completed).

Osage Railway

First Track: Foraker, Okla., to Shidler, 10.4 miles.

Pennsylvania Railroad

First Track: In Pennsylvania, from Alexandria Branch near Crabtree, 3.61 miles. In Pennsylvania, Stroud Branch—Cresson division, 0.03 mile.

Pere Marquette

Other Important Work Under Construction: Construction of new line on Flint Belt Railroad to Flint, Mich., 8.2 miles.

Philadelphia & Reading

Second Track: In Pennsylvania at Darby Creek, 0.23 miles.

Pittsburgh & Lake Erie

Other Important Work Under Construction: Replacement of old steel viaduct at Homestead, Pa., cost \$212,000 (2 per cent completed).

Pittsburgh & West Virginia

First Track: In West Virginia, 1.27 miles. In Pennsylvania, 1.88 miles.

Other Important Work Under Construction: New classification yard and reinforced coaling station, etc., at Avella, Pa., cost \$25,000 (completed).

Pittsburgh, Chartiers & Youghiogheny

Other Important Work Under Construction: Building new line from Van Emman, Pa., to Eighty-four, Pa., 8.36 miles.

Rapid Railroad

First Track: Detroit, Mich., to Mt. Clemens, 0.95 miles.

Second Track: Detroit, Mich., to Mt. Clemens, 2.51 miles.

Roby & Northern

Other Important Work Under Construction: New line under project from Roby, Tex., to Sweetwater, 23 miles.

Santa Fe Northwestern

Other Important Work Under Construction: New line under construction from Bernalillo, N. M., to a point beyond La Ventana, 63 miles.

St. Louis-San Francisco

Second Track: Windsor Springs, Mo., to Valley Park, 4.75 miles. Swedeberg, Mo., to St. John, 3.57 miles.

Other Important Work Under Construction: Grade reduction and line revision at Creeker, Mo., cost \$208,000 (90 per cent completed).

St. Louis-Southwestern

Other Important Work Under Construction: Renewal of 200-ft. span over Trinity river and 3,200 ft. of trestle approach at Trinidad, Tex., cost \$141,000 (completed). Paving 3,700 sq. yd. and rearranging tracks on Mary street, Waco, Tex., cost \$101,000 (90 per cent completed).

Southern Railway

Second Track: New Line, Tenn., to Morristown, 1.01 miles. Gest street, Cincinnati, Ohio, to state line, 0.55 mile. Kentucky-Ohio state line to Ludlow, Ky., 0.25 mile.

Other Important Work Under Construction: Double-track, silicon steel bridge, 3,240 ft. long, across the Ohio river between Cincinnati, Ohio, and Ludlow, Ky., cost \$3,600,000 (completed).

Southern Pacific

Second Track: Kern Junction, Calif., to Sivert, 11.60 miles. Tehachapi, Calif., to Cameron, 9.18 miles.

Other Important Work Under Construction: Tie treating plant at Wilmington, Calif., cost \$175,000 (completed). Tie storage yard, same location, cost \$165,000 (25 per cent completed). Classification yards at Los Angeles, Calif., cost \$265,000 (completed). Changes in old levee at Algiers, La., cost \$173,000 (completed). Replacement of 259,100 sq. ft. of wooden floor and 6,564 lin. ft. of wooden bulkhead with concrete floor and retaining wall at Galveston, Tex., cost \$150,000 (completed). Machine shop at El Paso, Tex., enlarged, cost \$240,700 (completed). Steel bridge over Rio Grande replaced at Eagle Pass, cost \$259,000 (10 per cent completed). Tunnel under tracks replaced with concrete at Houston, Tex., cost \$316,000 (50 per cent completed). Engine terminal and yard improvements and grade and line revisions, at various points on the system, cost \$750,000 (5 per cent completed). Strengthening of trestles between Beaumont, Tex., and Dallas to carry heavy traffic, cost \$410,000 (completed). Changing of creosote plant at Houston, Tex., cost \$117,500 (85 per cent completed).

Stockton Terminal & East

Second Track: In California, 0.5 mile.

Tennessee Railroad

Other Important Work Under Construction: Building new branch line at Beech Fork, Tenn., cost \$140,000. Building new branch line from Montgomery branch line, cost \$100,000.

Texas Southeastern

Other Important Work Under Construction: New line under construction from Vair, Tex., to Hiltonia, 40 miles.

Tuckaseegee & Southeastern

First Track: Sylva, N. C., to East La Port, 12 miles.

Ulster & Delaware

Other Important Work Under Construction: Extending present locomotive erecting shop, building new boiler house, installing electric crane and providing other new equipment at Kingston, N. Y., cost \$150,000 (60 per cent completed).

Union Pacific

Other Important Work Under Construction: Rebuilding portion of 10th street viaduct at Omaha, Nebr., cost \$168,477 (completed). Addition to passenger station at Cheyenne, Wyo., cost \$109,410 (completed). Coaling station at Carter, Wyo., cost \$111,028 (35 per cent completed). New freight house, office building, etc., at Denver, Colo., cost \$600,393 (50 per cent completed). Overhead steel viaduct and approaches at Denver, cost \$269,992 (10 per cent completed). Building 124-pen, feeding yards, hay barn with necessary grading, water supply, fire protection, etc., at Marysville, Kan., cost \$143,095 (completed).

Union Railroad

Other Important Work Under Construction: Construction of yard and fill tracks at Universal, Pa., for the disposal of waste material, cost \$187,000 (50 per cent completed).

Virginian

First Track: Virwest, W. Va., to Glen Rogers, 14.46 miles.

Other Important Work Under Construction: Building 3.6 miles of line to connect with coal territory. Five-stall extension of enginehouse and alterations to old house at Elmore, W. Va., cost \$129,000 (completed). Building pumping plant on Nottoway river at Victoria, Va., cost \$206,000 (completed). Building coal pier at Sewalls Point, Va., cost \$3,265,000.

Wabash

Other Important Work Under Construction: Extension of the present concrete elevator at North Kansas City, Mo., cost \$105,000 (25 per cent completed). Four through-truss, steel spans removed and replaced with steel deck plate girder spans on concrete piers and concrete slab deck at Attica, Ind., cost \$115,000 (90 per cent completed).

Washington, Brandywine & Point Lookout

Other Important Work Under Construction: Building new line from Mechanicsville, Md., to Hollywood, 12 miles.

Western Maryland

Other Important Work Under Construction: Locomotive repair shop, 100 ft. by 300 ft., at Port Covington, Md., cost \$400,000 (completed). Additions to grain elevator, workhouse and drying facilities and extension of dock gallery at Port Covington, cost \$1,000,000 (completed).

Western Pacific

First Track: Bidwell, Calif., to Bidwell Bar, 2.02 miles. In California, not specified, 0.83 mile.

Other Important Work Under Construction: Replacing San Joaquin river bridge, cost \$280,000 (90 per cent completed). New ice plant at Carlin, Nev., cost \$170,000 (65 per cent completed). Construction of North Channel spur at Stockton, Calif., 6.3 miles long, cost \$275,000 (50 per cent completed).

Wichita Northwestern

Other Important Work Under Construction: New line under project from Vaughn, Kan., to La Crosse, 13 miles.

Wichita Valley

Other Important Work Under Construction: Building from Byers, Tex., to Waurika, Okla., 13.30 miles.

Winston-Salem Southbound

Second Track: Winston-Salem, N. C., to Fries Yard, 3.02 miles.

Wyandotte Terminal

First Track: In Michigan, 0.82 mile.

Yazoo & Mississippi Valley

Other Important Work Under Construction: Concrete viaduct over Illinois Central and Yazoo & Mississippi Valley tracks at McLemore avenue, Memphis, Tenn., cost \$105,000 (completed). Rearrangement of northbound and southbound main tracks at west end of Nonconah yard, cost \$100,000 (completed).

Railway Construction in Canada in 1922**Canadian National Railways**

First Track: In Canada, not specified, 1.48 miles.

Canadian Pacific

First Track: Russell, Manitoba, north, 5.8 miles. Langdon, Alberta, north, 19.63 miles. Weyburn, Alberta, westerly, 17.39 miles. Leader, south-easterly, Saskatchewan, 26.5 miles.

Other Important Work Under Construction: Building new line, Inter-provincial and James Bay, Quebec, 78 miles, of which 42 are graded; Moose Jaw, southwest, Saskatchewan, 61 miles, the grading of which has been completed and rail laid on 30 miles.

Grand Trunk

Other Important Work Under Construction: Elevator repairs and improvements at Depot Harbor, Ont., cost \$158,000 (completed). Overhead bridge at Main street, Toronto, rebuilt and enlarged, cost \$120,000 (completed).

Esquimalt & Nanaimo

Other Important Work Under Construction: Combined highway and railway bascule steel bridge over the inner harbor at Victoria, B. C., cost \$850,000 (highway section completed).

Kettle Valley

First Track: In British Columbia, 16.7 miles.

Lacombe & North-Western

First Track: In Alberta, from Mile Posts 36.7 to 49.3, 12.6 miles.

Temiskaming & Northern Ontario

First Track: In Province of Ontario, from Cochrane, 44.4 miles.

Other Important Work Under Construction: Building new line near New Post, 25.8 miles. New line under survey from near New Post to Moose Factory, 110 miles.

Receiverships and Foreclosure Sales During 1922

Mileage Operated by Receivers on December 31 Totaled
16,081; At End of 1921, 14,502

INCLUDING the Missouri, Kansas & Texas lines and the Toledo, St. Louis & Western, the mileage of railway lines in the hands of receivers on December 31, 1922, totaled 16,081. This mileage, compared with 14,502 miles at the end of 1921, and with the exception of that year, represents the smallest mileage of railway lines in the hands of receivers since 1912. If we were to exclude the Missouri, Kansas & Texas with its system mileage of 3,807 and the Clover Leaf, which has a mileage of 454, the total would be 11,820, which would look very favorable indeed. The Missouri, Kansas & Texas is about to be turned over to its new management under the terms of the reorganization plan. The foreclosure sales have taken place, so the Katy lines are included in the list of foreclosure sales of 1922 which is given in one of the tables. It is not expected at this time, however, that the receiver will be discharged until about the first of February or possibly the first of March, so that as of December 31, 1922, the system must be shown as being still in the hands of receivers. The interesting feature in connection with the Clover Leaf, or Toledo, St. Louis & Western, situation is embodied in the fact that it is about to be merged with the New York, Chicago & St. Louis. There is not to be any foreclosure sale. This will eliminate

the Clover Leaf from the receivership list, but not of December 31, 1922.

The roads that went into the hands of receivers during 1922 totaled 12 with a total mileage of 4330. The two

RECEIVERSHIPS ESTABLISHED IN 1922

Name of road	Mileage	Funded debt outstanding	Capital stock outstanding
Carolina & Yadkin River.....	35	\$1,288,600	\$1,840,000
Central Indiana.....	127	1,500,000	120,000
Chicago & Alton.....	1,052	88,003,878	39,955,500
Cleveland, Southwestern & Columbus.....	212	4,455,000	6,648,000
Denver & Rio Grande Western.....	2,604	120,226,000	57,988,582
Detroit, Bay City & Western.....	126	729,000	450,000
Ettrick & Northern.....	10	49,300	144,000
Loranger, Louisiana & North Eastern.....	10	100,000	25,000
Midland Railway.....	88	360,000	500,000
Peoria Railway Terminal.....	11	2,444,000	1,000,000
Randolph & Cumberland.....	23	138,000	1,000,000
Savannah & Southern.....	32	.....	150,000
	4,330	\$219,293,778	\$109,821,082

most important of these were the Denver & Rio Grande Western and the Chicago & Alton. The former had just been reorganized as the successor to the Denver & Rio Grande, which had been operated by a receiver since January, 1918. The appointment of the present receiver dates

FORECLOSURE SALES IN 1922

Name of road	Mileage	Funded debt outstanding	Capital stock outstanding	Remarks
Alabama & Mississippi.....	78	\$184,000	\$10,000	
Colorado Springs & Cripple Creek District.....	74	2,667,879	2,000,000	
Franklin & Pittsylvania.....	30	35,000	202,650	
Hawkinsville & Florida Southern.....	96	586,000	100,000	
International & Great Northern.....	1,160	26,315,000	4,822,000	
Memphis, Dallas & Gulf.....	125	2,052,000	2,052,000	
Missouri & North Arkansas.....	365	8,340,000	8,340,000	
Missouri, Kansas & Texas.....	1,738	.....	.....
Missouri, Kansas & Texas of Texas.....	1,740	.....	.....
Wichita Falls & Northwestern.....	329	.....	.....
Total, M. K. & T. Lines.....	3,807	143,322,900	76,309,657	
Orangeburg Railway.....	18	.....	.....
Tennessee, Alabama & Georgia.....	95	364,683	1,446,577	
Tennessee Central.....	293	12,220,900	8,000,000	
Waupaca—Green Bay.....	10	69,000	61,400	
	6,151	\$196,157,362	\$103,344,284	

Operation discontinued.

Fifty-one miles sold to Ga., Ashburn, Sylvester & Camilla. Bought by St. L.-S. F. Now operated by Graysonia, Nashville & Ashdown. Resumed operation, April 24, 1922.

Now in process of reorganization as Missouri-Kansas-Texas Lines.

Sold April 22, 1922; new company formed. Turned over to new company January 31, 1922. Taken over by Green Bay & Western.

RAILROADS IN THE HANDS OF RECEIVERS

Name of road	Mileage operated	Mileage owned	Date of receivership	Funded debt outstanding	Capital stock outstanding	Total old company securities	Remarks
Altoona Northern	16	16	Aug. 8, 1919	\$370,000	\$675,000	\$1,045,000	Operation discontinued
Atlanta, Birmingham & Atlantic	640	637	Feb. 25, 1921	9,730,907	30,000,000	39,730,907	
Birmingham & Southeastern	48	51	July 26, 1920	747,606	728,000	1,475,606	
Birmingham, Columbus & St. Andrews	38	19	Dec. 24, 1908	250,000	.....	250,000	
Cape Girardeau Northern	104	104	April 14, 1914	1,156,000	110,000	1,266,000	
Cardina & Yadkin River	35	35	April 18, 1922	1,288,600	1,840,000	3,128,600	
Caro Northern	17	17	Sept. 1, 1921	.....	100,000	100,000	
Central Indiana	127	118	Oct. 31, 1922	1,500,000	120,000	1,620,000	
Chicago & Alton	1,052	686	Aug. 31, 1922	88,003,878	39,955,500	127,959,378	
Chicago, Peoria & St. Louis	247	235	Aug. 1, 1914	3,951,000	4,000,000	7,951,000	
Cleveland, Southwestern & Columbus	212	202	Jan. 20, 1922	4,455,000	6,648,000	11,103,000	
Colorado Springs & Cripple Creek District	74	74	May 2, 1919	2,667,879	2,000,000	4,667,879	Sold Oct. 16, 1922
Colorado, Wyoming & Eastern	111	111	Dec. 1, 1921	2,390,000	4,110,500	6,500,500	
Columbus & Greenville	168	168	June 4, 1921	5,655,000	.....	5,655,000	
Cumberland Railroad	13	13	April 5, 1920	1,087,000	100,000	1,187,000	
Dansville & Mount Morris	15	15	June 8, 1894	150,000	50,000	200,000	
Dayton, Toledo & Chicago	95	90	April 29, 1921	386,980	300,000	686,980	Operation discontinued July 31, 1922
Delaware & Northern	50	50	March 16, 1921	20,000	1,250,000	1,270,000	
Denver & Rio Grande Western	2,604	2,485	July 21, 1922	120,226,000	57,988,582	178,214,582	
Denver & Salt Lake	255	252	Aug. 16, 1917	12,019,149	583,515	12,602,664	
Detroit, Bay City & Western	126	100	Sept. 29, 1922	729,000	450,000	1,179,000	
Eastern Kentucky	36	36	March 31, 1919	.....	3,455,900	3,455,900	
Ettrick & Northern	10	10	June 28, 1922	49,300	144,000	193,300	
Fort Smith & Western	250	197	Oct. 9, 1915	6,240,000	5,000,000	11,240,000	
Fort Smith, Poteau & Western	3	3	Sept. 22, 1921	.....	.....	.....	Operation discontinued
Gainesville Midland	74	72	Feb. 15, 1921	963,285	550,000	1,513,285	
Georgia & Florida	402	402	March 27, 1915	8,616,000	8,695,000	17,311,000	
Gulf, Texas & Western	130	99	Jan. 24, 1921	2,000,000	500,000	2,500,000	
Hampden Railroad Corp.	15	15	March 17, 1921	2,000,000	1,400,000	3,400,000	Not operated
Helena, Parkin & Northern	15	15	July 3, 1919	65,000	100,000	165,000	
Houston & Brazos Valley	30	28	Oct. 28, 1915	420,000	24,000	444,000	
Kansas City, Mexico & Orient	272	260	Apr. 17, 1917	5,640,000	20,000,000	25,640,200	
Kansas City Northwestern	171	161	Feb. 27, 1917	.....	.....	.....	Operation, except of terminals, suspended
Loranger, Louisiana & North Eastern	10	8	Jan. 9, 1922	100,000	25,000	125,000	
Macon & Birmingham	97	97	Feb. 1, 1908	1,200,000	1,200,000	2,400,000	Operation discontinued
Manistee & North Eastern	214	183	Dec. 24, 1918	1,012,030	2,000,000	3,012,000	
Midland & Northwestern	65	65	March 1, 1920	213,666	10,035	223,701	Operation discontinued
Midland Railway	88	88	March, 1922	360,000	500,000	860,000	
Missouri, Kansas & Texas Lines	3,807	3,557	Sept. 27, 1915	143,322,900	76,309,657	219,632,557	Will be turned over to new company shortly
Morgantown & Wheeling	27	24	July 26, 1916	730,000	345,800	1,075,800	
Muscateen, Burlington & Southern	55	49	May 20, 1921	569,900	750,000	1,319,900	Foreclosure expected shortly
Northwestern Terminal	7	7	Jan. 21, 1920	2,217,000	3,000,000	5,217,000	Denver & Salt Lake subsidiary
Ocala Southern	69	59	June 30, 1918	416,000	265,000	681,000	
Ocklawaha Valley	54	54	Jan. 11, 1918	.....	250,000	250,000	
Paris & Mt. Pleasant	57	57	Feb. 26, 1920	600,000	75,000	675,000	
Peoria Railway Terminal	11	11	Aug. 3, 1922	2,444,000	1,000,000	3,444,000	
Pine Bluff & Northern	8	8	Feb. 9, 1916	.....	160,000	160,000	
Pittsburg, Shawmut & Northern	210	190	Aug. 1, 1905	14,655,600	15,000,000	29,655,600	
Randolph & Cumberland	23	23	Feb. 8, 1922	138,000	1,000,000	1,138,000	
Rome & Northern	23	18	Feb. 28, 1911	.....	1,000,000	1,000,000	Operation discontinued August 15, 1922
St. Louis, El Reno & Western	42	42	Oct. 9, 1915	817,000	970,800	1,787,800	
Salina Northern	81	81	July 27, 1917	1,500,000	1,143,300	2,643,300	
San Antonio, Uvalde & Gulf	317	315	Aug. 14, 1914	4,413,000	280,000	4,693,000	
Savannah & Atlanta	147	147	March 4, 1921	3,377,760	2,250,000	5,627,760	
Savannah & Southern	32	32	March 2, 1922	.....	150,000	150,000	
Sharpsville Railroad	21	21	Jan. 21, 1897	.....	350,000	350,000	
Texas & Pacific	1,953	1,848	Oct. 27, 1916	59,829,820	38,763,110	98,592,930	
Timpson & Henderson	34	34	March 6, 1920	.....	250,000	250,000	
Toledo, Peoria & Western	248	231	July 2, 1917	4,895,000	4,076,000	8,971,000	Receivership terminated Jan. 1, 1923
Toledo, St. Louis & Western	454	450	Oct. 22, 1914	15,500,000	20,000,000	35,500,000	
Trinity & Brazos Valley	324	303	June 16, 1914	9,807,014	304,000	10,111,014	
West Virginia Midland	46	46	Dec. 26, 1921	67,500	120,000	187,500	
Wichita Falls, Ranger & Ft. Worth	102	75	May 20, 1920	600,000	520,000	1,100,000	
	16,081	14,899		\$551,563,944	\$362,925,699	\$914,489,643	

from July 21, 1922, and resulted not so much from present operating difficulties as from the fact that the bondholders of the old company were not satisfied with the plan under which the road was reorganized under its new name.

The Alton receivership results from a situation quite different in character. It is a result—although, of course, not entirely—of 1922 operating troubles represented notably in the effects of the coal and shopmen's strikes. Coal constitutes normally about one-half the Alton's total tonnage. The receiver was appointed August 30. The announcement made at the time referred to these two factors and pointed out also the handicap of the excessive terminal costs and also the high fuel costs incident upon inability to secure regular supplies. It was also stated that the Alton had for several years been unable to meet all of the interest on its 6 per cent general mortgage bonds, but that the holders of the bonds have permitted the interest to remain unpaid in the hope that general railroad conditions ultimately would adjust themselves in such a way as to restore the property's prosperity. It was found that realization of this hope was not to be expected under the Alton's 1922 conditions.

Except for the Denver & Rio Grande Western and the Alton receiverships, 1922, as a whole, was characterized by a considerable measure of improvement, notably with reference to the mileage taken out of the hands of receivers and

RAILROAD MILEAGE IN THE HANDS OF RECEIVERS

(Figures to 1920, Inclusive, from I. C. C. Statistics for Year Ended December 31, 1920)

Years ended	Miles of road operated by receivers at close of year	Net change during the year in miles of road operated	Number of roads in charge of receivers at close of year
June 30, 1894	40,819	.....	192
1895	37,856	-2,963	169
1896	30,476	-7,380	151
1897	18,862	-11,614	128
1898	12,745	-6,117	94
1899	9,853	-2,892	71
1900	4,178	-5,675	52
1901	2,497	-1,681	45
1902	1,475	-1,022	27
1903	1,185	-290	27
1904	1,323	+138	28
1905	796	-527	26
1906	3,971	+3,175	34
1907	3,926	-45	29
1908	9,529	+5,603	52
1909	10,530	+1,001	44
1910	5,257	-5,273	39
1911	4,593	-664	39
1912	9,786	+5,193	44
1913	16,286	+6,500	49
1914	18,608	+2,322	68
1915	30,223	+11,615	85
1916	37,353	+7,130	94
Dec. 31, 1916	34,804	-2,550	80
1917	17,376	-17,428	82
1918	19,208	+1,832	74
1919	16,590	-2,618	65
1920	16,290	300	61
1921	14,502	.....	.....
1922	.....	.....	.....

*Represents decrease for six months.

also as relates to the considerable mileage on which operation, discontinued during 1920 or 1921, was restored. We have already spoken of the Katy and Clover Leaf, the

SUMMARY OF FORECLOSURE SALES 1876 TO 1922

Year	Number of roads	Miles	Bonds and stocks
1876	30	3,840	\$217,848,000
1877	54	3,875	198,984,000
1878	48	3,906	311,631,000
1879	65	4,909	243,288,000
1880	31	3,775	263,882,000
1881	29	2,617	137,923,000
1882	16	867	65,426,000
1883	18	1,354	47,100,000
1884	15	710	23,504,000
1885	22	3,156	278,394,000
1886	45	7,687	374,109,000
1887	31	5,478	328,181,000
1888	19	1,596	64,555,000
1889	25	2,930	137,495,000
1890	29	3,825	182,495,000
1891	21	3,223	169,069,000
1892	28	1,922	95,898,000
1893	25	1,613	79,924,000
1894	42	5,643	318,999,000
1895	52	12,831	761,791,000
1896	58	13,730	1,150,377,000
1897	42	6,675	517,680,000
1898	47	6,054	252,910,000
1899	32	4,294	267,534,000
1900	24	3,477	190,374,000
1901	17	1,139	85,808,000
1902	20	693	39,788,000
1903	13	555	15,885,000
1904	13	524	28,266,000
1905	6	679	20,307,000
1906	8	262	10,400,000
1907	6	114	13,777,000
1908	3	138	2,547,000
1909	12	2,629	250,033,000
1910	17	1,100	93,660,109
1911	13	1,386	40,741,543
1912	12	661	25,910,990
1913	6	1,159	86,163,850
1914	9	1,470	83,189,500
1915	11	3,914	285,258,782
1916	26	8,355	703,444,855
1917	20	10,963	557,846,348
1918	11	763	24,735,187
1919	8	459	15,479,587
1920	7	380	7,676,200
1921	11	4,173	306,123,942
1922	15	6,151	299,491,646

receiverships of which are shortly to be terminated. In addition to these two, another important line is the International & Great Northern which, until its reorganization under its new name of International-Great Northern, has been in the hands of a receiver since 1914. The latest interesting development in connection with this road is the announcement of the proposed purchase of the new company by the St. Louis-San Francisco.

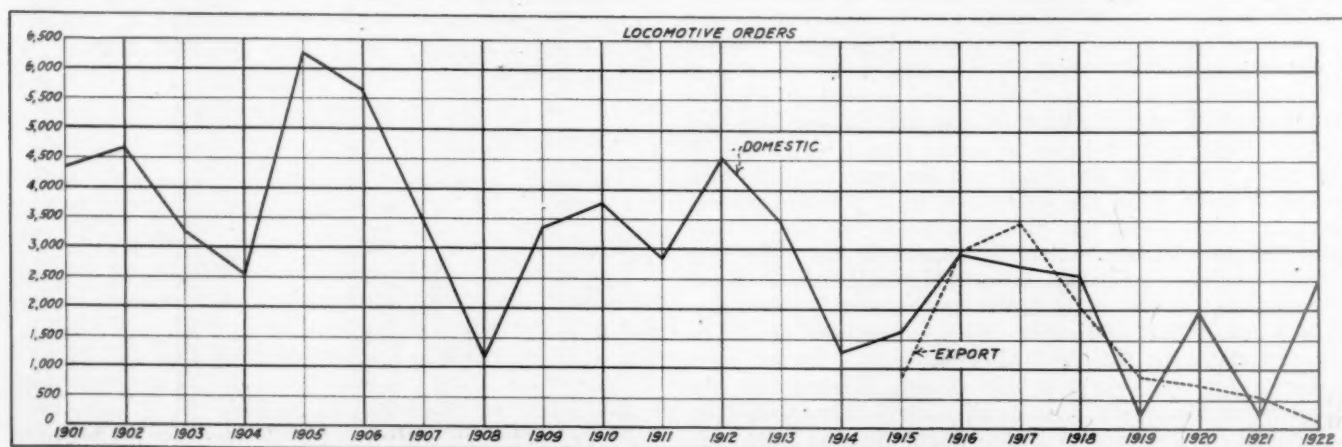
A year ago, in commenting on the receiverships in force at that time, something was said concerning lines in receivership which had discontinued operation. Railway conditions in 1922 were not extremely good, due to the coal strike, the shopmen's strike and related developments, but they were very much better than in 1921. This was reflected in a much smaller number of roads in receiverships which ceased

operation and a restoration to operation of a number that had previously abandoned service. The Louisiana & North-west shown in the December 31, 1921, list of roads in receivership and as having taken up some of its track, has had an entirely new lease of life largely due to development of oil territory which it serves; details concerning the improved operating conditions of the road will be found in an article which appeared in the *Railway Age* of October 7, page 666. The Alabama & Mississippi which went into receivership in 1921, was granted in that year authority to abandon 67 miles of line. It was, however, sold at foreclosure in 1922 and is to be operated by a new company. The Hawkinsville & Florida Southern was shown in the

ROADS GOING INTO RECEIVERSHIP, 1876 TO 1922

Year	Number of roads	Miles	Bonds and stocks
1876	42	6,662	\$467,000,000
1877	38	3,637	220,294,000
1878	27	2,320	92,385,000
1879	12	1,102	39,367,000
1880	13	885	140,265,000
1881	5	110	3,742,000
1882	12	912	39,074,000
1883	11	1,990	108,470,000
1884	37	11,038	714,755,000
1885	44	8,836	385,460,000
1886	13	1,799	70,346,000
1887	9	1,046	90,318,000
1888	22	3,270	186,814,000
1889	22	3,803	99,664,000
1890	26	2,963	105,007,000
1891	26	2,159	84,479,000
1892	36	10,508	357,692,000
1893	74	29,340	1,781,046,000
1894	38	7,025	395,791,000
1895	31	4,089	369,075,000
1896	34	5,441	275,597,000
1897	18	1,537	92,909,000
1898	18	2,069	138,701,000
1899	10	1,019	52,285,000
1900	16	1,165	78,234,000
1901	4	73	1,627,000
1902	5	278	5,835,000
1903	9	229	18,823,000
1904	8	744	36,069,000
1905	10	3,593	176,321,000
1906	6	204	55,042,000
1907	7	317	13,585,000
1908	24	8,009	596,359,000
1909	5	859	78,095,000
1910	7	735	51,427,500
1911	5	2,606	210,606,882
1912	13	3,784	182,112,497
1913	17	9,020	477,780,820
1914	22	4,222	199,571,446
1915	12	20,143	1,070,808,628
1916	9	4,439	208,159,689
1917	19	2,486	61,169,962
1918	8	3,519	242,090,800
1919	7	244	11,886,779
1920	10	541	21,620,150
1921	14	1,744	63,872,113
1922	12	4,330	109,821,082

1921 receivership with the notation that it had been abandoned but not taken up. Part of the line, 51 miles of the total of 96, was sold during 1922 and will be operated by a new company known as the Graysonia, Nashville & Ash-down. And last, but not least, is the 345-mile Missouri & North Arkansas which resumed operation on April 24.



Plotting the Figures Shown in Table II on the Following Page



A Powerful Mikado Type for the Delaware, Lackawanna & Western, Maximum Tractive Effort, with Booster, 79,200 lb.

Locomotive Orders in 1922 Best Since 1918

Buying Movement Will Apparently Continue Into 1923—
Nearly Every Road Places Orders

LOCOMOTIVES ordered during 1922 for domestic service in the United States totaled 2,600, according to the compilations of the *Railway Age*. This total was more than 10 times the figure of 239 reported in 1921, that year being the poorest with one exception, namely, 1919, which has ever been experienced. Although the 1922 figure was over 10 times that of 1921, it did not prove at all spec-

—was characterized by a resumption of locomotive purchasing on a large scale for the first time since 1918, in which year the United States Railroad Administration placed its orders for the U. S. R. A. standard locomotives. The 1922 buying movement is still continuing, as was evidenced by the large orders placed in December and even in the last week of that month, in which week there is usually a falling off because of the holidays. The situation as a whole, therefore, augurs well for the present year.

This buying movement was first in evidence in April, but it did not begin in earnest until July. By far the larger part of the year's business was placed in the latter six months and in this period practically every railroad in the country came into the market and placed fairly large orders for new motive power. A noteworthy feature was that the buying continued in volume through months when under normal conditions there is usually a slight falling off. It similarly

TABLE I—LOCOMOTIVE ORDERS OF 1921

For service in the United States.....	2,600
For service in Canada.....	68
For export to other countries.....	131
Grand total.....	2,799

tacular as compared with other preceding years. The figure was the best reported since 1918, but is below rather than above the averages for various of the other preceding years shown in the tables.

Orders placed by railroads in Canada with Canadian builders totaled 68 as compared with 35 in 1921 and 189 in 1920.

The export business in 1922 was largely conspicuous by its absence. There are shown in the tables of locomotive

TABLE II—ORDERS FOR LOCOMOTIVES SINCE 1901

Domestic orders only			
Year	Locomotives	Year	Locomotives
1901.....	4,340	1908.....	1,182
1902.....	4,665	1909.....	3,350
1903.....	3,283	1910.....	3,787
1904.....	2,538	1911.....	2,850
1905.....	6,265	1912.....	4,515
1906.....	5,642	1913.....	3,467
1907.....	3,482	1914.....	1,265

Domestic and Foreign				
Year	Domestic	Canadian	Export	Total
1915.....	1,612	....	850	2,462
1916.....	2,910	....	2,983	5,893
1917.....	2,704	....	3,438	6,142
1918.....	2,593	209	2,086	4,888
1919.....	214	58	989	1,170
1920.....	1,998	189	718	2,905
1921.....	239	35	546	820

Prior to 1918 Canadian orders included under "Domestic."

orders which appear below only 131 locomotives. This compared with 546 in 1921, with 718 in 1920, and is the smallest figure which the *Railway Age* has reported since the practice was begun in 1915 of tabulating the totals of export orders.

The year 1922—as far as domestic business was concerned

TABLE III—LOCOMOTIVES BUILT IN 1922

Domestic.....	1,303
Foreign.....	231
Total.....	1,534

Comparison with previous years

Year	Domestic	Foreign	Total	Year	Domestic	Foreign	Total
1896.....	866	309	1,176	1909*	2,596	291	2,887
1897.....	865	386	1,251	1910*	4,441	314	4,755
1898.....	1,321	554	1,875	1911*	3,143	387	3,530
1899.....	1,951	514	2,475	1912†	4,403	512	4,915
1900.....	2,648	505	3,153	1913†	4,561	771	5,332
1901.....	....	....	3,384	1914†	1,962	273	2,235
1902.....	....	....	4,070	1915†	1,250	835	2,085
1903.....	....	....	5,152	1916†	2,708	1,367	4,075
1904.....	....	....	3,441	1917†	2,585	2,861	5,446
1905*	4,896	595	5,491	1918†	3,668	2,807	6,475
1906*	6,232	720	6,952	1919†	2,162	1,110	3,272
1907*	6,564	798	7,362	1920†	2,022	1,650	3,672
1908*	1,886	456	2,342	1921†	1,185	638	1,823

*Includes Canadian output.

†Includes Canadian output and equipment built in railroad shops.

seemed to be unaffected by such adverse factors as the coal strike and the shopmen's strike, both of which had severe effects on net earnings.

The large locomotive business during the year naturally reflects some of the more general aspects of the railway situation as a whole in 1922, although it is not as easy as might be desired to distinguish cause and effect. However, there can be little question that the locomotive orders reflected the optimistic opinions which were generally held as to the expected improvement in business. Conditions in the railway field first began to look more favorable fairly early in the year when the earnings reports of the roads began to show much better net than in the corresponding months of

1921. It early began to be evident that industry was picking up rapidly. The coal strike, which began April 1, caused a sharp falling off in coal traffic with particularly adverse effects to the coal carriers, but it was readily realized that this business would be restored at the end of the strike and in a manner which would attempt to make up lost time. This condition, combined with an expected improvement in industry as a whole, which became more and more evident as the year advanced, made it necessary for the railroads to put their houses in order to handle a volume of traffic much in excess of that handled in 1921 and nearly comparable with that handled in the peak months of 1918 or 1920. The orders were placed partly in anticipation of this traffic but rather more in anticipation of its continuance into 1923. In fact, a large proportion of the orders have not yet been delivered.

It is difficult to say whether the strike of the railway shopmen may have had an effect on the volume of locomotive purchasing. On the one hand, it affected net earnings very adversely and unfavorable net earnings are not usually reflected in large purchases of railway equipment. On the other hand, the difficulties of keeping locomotives in service served to emphasize only too plainly any lack of sufficient motive power that might have existed. The situation on some roads was for a time, and on others still continues to be, serious as was shown on October 15 by a percentage of freight locomotives held for repairs requiring over 24 hours of 26.7 per cent, or on December 1 of 24 per cent.

During 1922 locomotive prices were somewhat more favorable than they had previously been. They were lower earlier in the year than they have been more recently, but they are still much below the levels which checked locomotive purchasing during the war period.

Taking the various factors by and large, it would appear

that the 1922—or rather the present—buying movement is due to more favorable net income, to more favorable prices, to conditions which emphasized any possible shortage of motive power during the shopmen's strike and finally and presumably most important of all, to the expectations of an expanding traffic, which expectations have recently been realized in the heaviest car loadings on record for the latter two months of the year.

Locomotive production in 1922 was comparatively small. This was due to the fact that the larger part of the orders placed were signed in the latter part of the year. In other words, a large proportion of the 1922 orders are still on the locomotive builders' books and have not yet been delivered. This—combined with the expectation that the present buying movement should be continued well into 1923—indicates a favorable condition for the present year. It does not necessarily indicate anything like record-breaking production, but it does indicate a considerable measure of improvement over some of the past few years. In speaking of production, reference should be made to the large amount of repair work done in the shops of the locomotive builders and in the shops of other concerns in related lines of business which engaged in this class of work. Due to the shopmen's strike an unusually large volume of locomotive repair work was given to other than railroad repair shops.

The locomotive orders which are listed in the accompanying tables are compiled from official sources. Some few omissions of small unimportant orders doubtless occur. The details presented were supplied by the railways and the industrial companies in response to inquiries from the *Railway Age*. They were checked against similar lists furnished through the co-operation of the builders and against the weekly reports in the Equipment and Supplies column of the *Railway Age*.

Locomotive Orders in 1922

For Service in the United States

Purchaser	No.	Type	Service	Weight	Cylinders	Mech. stoker	Feed water heater	Builder
Akron, Canton & Youngstown.....	2	2-8-0	Freight	155,000	20 x 26	No	Yes	Baldwin
Alabama & Vicksburg.....	1	4-6-2	Passenger	225,000	22 x 28	No	No	Baldwin
	1	2-8-2	Freight	219,000	22 x 28	No	No	Baldwin
	2	2-10-2	Freight	270,000	26 x 28	No	No	Baldwin
	1	0-10-0	Switching	320,000	30 x 32	No	No	Baldwin
Alabama Great Southern.....	10	2-8-2	Freight	288,000	26 x 30	No	No	American
American Brake Shoe & Fdy.....	1	0-4-0	.....	99,000	16 x 24	.....	.....	American
American Sintering Co.....	1	Geared	.....	52,000	.....	.....	.....	Heisler
American Woolen Co.....	1	0-4-0	.....	99,000	16 x 24	.....	.....	American
Apalachicola Northern.....	2	2-8-0	Freight	123,500	18 x 24	No	.....	American
Atchison, Topeka & Santa Fe.....	20	2-10-2	Freight	396,500	30 x 32	No	Yes	Baldwin
	6	2-10-2	Freight	407,000	30 x 32	Yes	Yes	Baldwin
	15	2-8-2	Freight	327,000	27 x 32	No	Yes	Baldwin
	3	4-8-2	Passenger	365,000	28 x 28	Yes	Yes	Baldwin
	5	4-8-2	Passenger	353,500	28 x 28	No	Yes	Baldwin
Atlantic Coast Line.....	10	4-6-2	Passenger	309,600	25 x 28	No	Yes	Baldwin
Baltimore & Ohio.....	45	4-6-2	Pass. & Frt.	275,950	25 x 28	No	No	Baldwin
	85	2-8-2	Freight	327,400	26 x 32	Yes	No	Baldwin
	15	4-6-2	Passenger	288,000	25 x 28	No	No	Baldwin
Bellgrade Lumber Co.....	2	0-4-4-0 Elec.	Pass. & Frt.	240,000	.....	.....	.....	General Electric
Boone Fork Mfg. Co.....	1	Geared	.....	64,000	.....	.....	.....	Heisler
Boston & Albany.....	8	2-8-2	Freight	334,000	28 x 30	Yes	Yes	American
Boston & Maine.....	22	0-8-0	Switching	221,000	25 x 28	No	No	American
Boston Elevated.....	2	0-8-8-0	Switching	465,000	26 & 40 x 28	No	No	American
Boyne City Lumber Co.....	1	0-4-4-0 Elec.	Switching	74,450	.....	.....	.....	Company shops
Brimstone R. R. & Canal Co.....	1	2-6-2	.....	66,000	12 x 18	.....	.....	American
Brooks-Scanlon Lbr. Co.....	1	0-6-0	.....	149,000	21 x 26	.....	.....	American
Brooks-Scanlon O'Brien Co.....	1	2-8-2	Freight	144,000	18 x 24	No	No	Baldwin
Brownell Improvement Co.....	1	2-8-2	Freight	144,000	18 x 24	No	No	Baldwin
Buffalo Slag Co.....	2	0-4-0	.....	79,000	14 x 22	.....	.....	American
Buffalo Lbr. & Mfg. Co.....	1	0-4-0	.....	99,000	16 x 24	.....	.....	American
Buffelen Lbr. & Mfg. Co.....	1	Geared	.....	126,000	.....	.....	.....	Heisler
Caddo River Lbr. Co.....	1	2-8-2	Freight	152,200	19 x 24	No	No	Baldwin
California & Oregon Lbr. Co.....	1	2-6-2	Freight	140,180	18 x 24	No	No	Baldwin
Camp Mfg. Co.....	1	2-6-2	.....	67,000	13 x 20	.....	.....	American
Campbell's Creek.....	1	2-8-0	Freight	158,520	20 x 24	No	No	Baldwin
Canton Railroad.....	1	0-6-0	Switching	163,280	21 x 28	No	No	Baldwin
Carey, W. F., Co.....	2	0-4-0	.....	79,000	14 x 22	.....	.....	American
Carnegie Steel Co.....	1	0-6-0	.....	177,000	22 x 28	.....	.....	American
Castner, Curran & Bullitt.....	1	0-4-0	.....	79,000	14 x 22	.....	.....	American
Central New England.....	20	0-8-0	Switching	220,000	25 x 28	No	No	American
Central of Georgia.....	2	4-8-2	Passenger	316,000	27 x 28	No	No	American
	8	2-8-2	Freight	280,000	24 x 30	No	No	American
	10	2-8-2	Freight	286,000	27 x 30	No	No	Lima
Central of New Jersey.....	10	2-8-2	Freight	342,500	27 x 32	Yes	Yes	American
	5	4-6-2	Passenger	293,400	26 x 28	No	No	Baldwin
	10	0-8-0	Switching	240,000	24 x 30	.....	.....	American
	5	0-6-0	Switching	.....	.....	.....	.....	American
Chesapeake & Ohio.....	25	Mallet	Freight	441,000	22 & 35 x 32	Yes	No	American
	6	4-6-2	Passenger	315,000	27 x 28	Yes	No	American
	2	4-8-2	Passenger	352,000	28 x 30	Yes	No	American
	25	Mallet	.....	.....	.....	.....	.....	American

Purchaser	No.	Type	Service	Weight	Cylinders	Mech. stoker	Feed water heater	Builder
Chicago & Eastern Illinois.....	10	2-8-2	Freight	310,000	28 x 30	Yes	No	American
	6	4-6-2	Passenger	311,000	27 x 28	No	No	Lima
Chicago & North Western.....	20	4-6-2	Passenger	273,500	25 x 28	No	No	American
	60	2-8-2	Freight	312,000	27 x 32	No	No	American
	20	0-6-0	Switching	184,000	21 x 28	No	No	American
	12	4-6-2	Passenger	294,000	26 x 28	...	...	American
	18	2-8-2	Freight	312,000	27 x 32	...	...	American
	20	0-6-0	Switching	184,000	21 x 28	...	...	American
Chicago, Aurora & Elgin.....	1	4-0-4 Elec.	Freight	100,000	...	...	...	General Electric
Chicago, Burlington & Quincy.....	8	4-8-2	Passenger	350,000	27 x 30	Yes	No	Lima
	22	2-8-2	Freight	299,810	27 x 30	No	No	Baldwin
	5	2-8-2	Freight	306,210	27 x 30	No	Yes	Baldwin
	5	2-8-2	Freight	305,700	27 x 30	No	Yes	Baldwin
	50	2-8-2	...	...	...	...	...	Baldwin
	10	2-10-2	...	...	...	...	...	Baldwin
Chicago Great Western.....	3	0-6-0	Switching	...	22 x 26	No	No	Baldwin
Chicago, Indianapolis & Louisville.....	4	2-8-2	Freight	290,000	27 x 30	No	No	American
	3	4-6-2	Passenger	237,000	23 x 28	No	No	American
Chicago, Milwaukee & St. Paul.....	100	2-8-2	Freight	287,600	26 x 30	Yes	No	Baldwin
Chicago, Rock Island & Pacific.....	24	2-8-2	Freight	332,000	28 x 30	No	No	American
	6	2-8-2	Freight	332,000	28 x 30	No	Yes	American
	10	4-8-2	Passenger	369,000	28 x 28	No	No	American
Cincinnati, New Orleans & Texas Pacific..	25	2-8-2	Freight	288,000	26 x 30	No	No	American
	6	0-8-0	Switching	214,000	25 x 28	No	No	Baldwin
Cleveland, Cincinnati, Chicago & St. Louis.	15	0-8-0	Switching	219,000	25 x 28	No	No	American
	15	4-6-2	Passenger	289,100	23 1/2 x 26	No	No	American
	50	2-8-2	Freight	334,000	28 x 30	Yes	Yes	American
Cleveland Cliffs Iron M. Co.....	3	0-6-0	Switching	134,000	19 x 26	...	...	American
Colorado & Southern.....	3	4-6-2	Passenger	293,870	27 x 28	No	No	Baldwin
	3	2-10-2	Freight	397,170	30 x 32	Yes	No	Baldwin
	1	2-10-2	Freight	400,810	30 x 32	Yes	Yes	Baldwin
	1	2-10-2	Freight	405,710	30 x 32	Yes	Yes	Baldwin
Commonwealth Edison Co.....	1	0-6-0	Switching	155,200	22 x 26	No	No	Baldwin
Cosden & Co.....	1	0-6-0	Switching	146,000	21 x 26	...	...	American
Dawkins Lumber Co.....	1	Geared	...	126,000	...	...	...	Heisler
Delaware & Hudson.....	1	2-8-0	Freight	312,000	23 1/2 & 41 x 30	No	No	American
Delaware, Lackawanna & Western.....	5	4-6-2	Passenger	301,000	25 x 28	No	No	American
	5	4-6-2	Freight	297,000	25 x 28	No	No	American
	40	2-8-2	Freight	356,500	28 x 32	Yes	No	American
	1	4-6-2	...	...	...	...	...	American
	1	0-4-0	Switching	96,780	16 x 24	No	No	Baldwin
Denver & Rio Grande Western.....	10	4-8-2	...	377,000	28 x 30	...	...	American
	10	2-8-8-2	...	531,000	25 & 39 x 32	...	...	American
	5	2-8-8-2	...	230,000	...	...	...	American
	10	4-8-2	Freight	325,000	28 x 30	Yes	Yes	American
	3	2-8-0	Freight	214,300	23 x 30	No	No	Baldwin
Detroit & Toledo Shore Line.....	4	0-8-0	...	240,000	25 x 30	...	...	American
Detroit Terminal.....	3	2-8-2	Freight	300,000	27 x 30	Yes	Yes	Baldwin
Duluth & Iron Range.....	1	Geared	...	64,000	...	...	...	Heisler
Emory River Lumber Co.....	1	0-4-2	Switching	57,780	12 x 18	No	No	Baldwin
Empire Mfg. Co.....	35	2-8-2	Freight	320,600	28 x 32	Yes	No	Baldwin
	5	2-8-2	Freight	320,600	28 x 32	Yes	Yes	Baldwin
	10	4-6-2	Passenger	281,600	25 x 28	No	...	Baldwin
	10	4-6-2	Passenger	306,000	27 x 28	Yes	...	Baldwin
Essex Terminal Ry. Co.....	1	0-6-0	...	145,000	20 x 26	...	...	American
Eureka Lumber Company.....	2	2-6-0	Freight	37,800	10 x 16	No	No	Baldwin
Findlay, J. H.....	1	Geared	...	64,000	...	...	...	Heisler
Florence Pipe Fdy. & Mach. Co.....	1	0-4-0	...	79,000	14 x 22	...	...	American
Florida East Coast.....	7	4-6-2	Pass. & Frt.	204,000	22 x 26	No	No	American
	3	0-6-0	Switching	154,000	20 x 26	No	No	American
Ft. Worth & Denver City.....	2	4-6-2	Passenger	292,750	27 x 28	Oil	No	Baldwin
	3	2-8-2	Freight	327,680	28 x 32	Oil	No	Baldwin
	1	2-8-2	Freight	334,560	28 x 32	Oil	Yes	Baldwin
	1	2-8-2	Freight	334,370	28 x 32	Oil	Yes	Baldwin
Fruit Growers Express.....	1	0-4-0	...	41,000	11 x 16	...	...	American
Georgia Northern.....	1	4-6-0	...	143,000	19 x 26	...	...	American
Georgia Railroad.....	5	2-8-2	Freight	292,000	26 x 30	No	No	Lima
Grand Trunk.....	8	2-8-2	...	300,000	26 x 30	...	...	American
Graves Bros. Co.....	2	2-6-2	Freight	92,000	15 x 24	No	No	Baldwin
Green Bay & Western.....	1	2-8-0	...	199,000	22 x 28	...	...	American
Greenwood Logging Co.....	1	Geared	...	126,000	...	...	...	Heisler
Gulf, Mobile & Northern.....	4	2-10-0	Freight	202,500	25 x 28	No	No	Baldwin
Gulf Refining Co.....	1	0-6-0	Switching	160,000	22 x 26	No	No	Baldwin
Hammermill Paper Co.....	1	0-4-0	...	99,000	16 x 24	...	...	American
Haynesville Lumber Co.....	1	2-6-2	Freight	92,000	15 x 24	No	No	Baldwin
Hebard, Chas., & Sons, Inc.....	1	2-6-2	Freight	92,330	15 x 24	No	No	Baldwin
Hedlund Box & Lumber Co.....	1	2-6-2	Freight	134,690	17 x 24	No	No	Baldwin
Holton Inter-Urban.....	1	2-6-2	...	...	...	...	...	American
Howe Lumber Co.....	1	Geared	...	52,000	...	...	...	Heisler
Humble Oil & Refining Co.....	1	0-6-0	Switching	100,000	17 x 24	No	No	Baldwin
Illinois Central.....	25	2-10-2	Freight	382,000	30 x 32	Yes	No	Lima
	25	2-8-2	Freight	282,700	27 x 30	No	No	American
	15	0-8-0	Switching	221,700	25 x 28	No	No	Baldwin
	75	2-8-2	Freight	282,700	27 x 30	No	No	Lima
Illinois Terminal.....	1	2-6-0	Switching	176,000	22 x 26	No	No	Baldwin
Indianapolis Union.....	5	0-8-0	Switching	216,000	25 x 28	No	No	Lima
International Harvester Co.....	4	0-6-0	Switching	121,000	19 x 26	No	No	Baldwin
International Paper Co.....	2	0-4-0	Switching	...	...	...	...	Baldwin
Joseph, Davis J., Co.....	1	0-4-0	...	65,000	13 x 20	...	...	American
Kaul Lumber Company.....	1	2-6-0	Freight	112,940	18 x 24	No	No	Baldwin
Kelley Island Lime & Transport Co.....	2	0-4-0	Switching	57,000	12 x 18	No	No	Baldwin
Leonard Kennedy & Co.....	4	0-6-0	...	...	...	...	...	Baldwin
Kentucky & Tennessee.....	1	2-8-2	...	275,000	25 x 30	...	...	American
Lake Terminal.....	2	0-8-0	Switching	225,600	25 x 30	No	No	Baldwin
Lakewood Sand & Gravel Co.....	1	0-4-0	...	79,000	14 x 22	...	...	American
Lehigh & New England.....	4	2-8-0	Freight	301,500	27 x 32	Yes	No	American
	3	2-8-0	Freight	301,500	27 x 32	Yes	No	American
Lehigh Portland Cement Co.....	1	0-4-0	...	79,000	14 x 22	...	...	American
	1	0-4-0	...	43,000	11 x 16	...	...	American
Lehigh Valley.....	10	2-8-2	Freight	320,000	27 x 30	Yes	No	Baldwin
	5	2-8-2	Freight	328,500	27 x 30	Yes	No	Baldwin
	10	2-8-2	Freight	333,000	27 x 32	Yes	No	American
	5	2-8-2	Freight	339,000	27 x 32	Yes	No	American
	5	2-8-2	Freight	325,000	27 x 32	Yes	No	Baldwin
Lock Haven Fire Brick Co.....	1	Geared	...	64,000	...	...	...	Heisler
Lodwick Lumber Co.....	1	2-6-0	Freight	60,700	13 x 20	No	No	Baldwin
Long Island.....	6	0-8-0	Freight	208,700	23 x 28	No	No	American
Los Angeles & Salt Lake.....	9	4-8-2	Passenger	340,000	29 x 28	Oil	No	American
	6	4-8-2	Passenger	345,000	29 x 28	Yes	No	American
Louisiana Central Lumber Co.....	1	2-6-2	Freight	154,000	20 x 24	No	No	Baldwin
Louisell Pine & Hardwood Co.....	1	Geared	...	80,000	...	...	...	Heisler
Louisville & Nashville.....	30	2-8-2	Freight	320,000	27 x 32	Yes	No	American
	12	2-8-2	Freight	292,000	26 x 30	Yes	No	American
	8	4-6-2	Passenger	277,000	25 x 28	No	No	Baldwin
	6	0-8-0	Switching	214,000	25 x 28	No	No	American
	10	2-8-2	Freight	292,000	26 x 30	Yes	No	American
	4	0-8-0	Switching	214,000	25 x 28	No	No	Company shops

Purchaser	No.	Type	Service	Weight	Cylinders	Mech. stoker	Feed. water heater	Builder
McKeesport Connecting	2	0-6-0	Switching	165,000	22 x 28	No	No	Baldwin
McKelvey Brothers	1	Shay						Lima
Maine Central	8	4-6-0	Freight	185,000	20 x 28	No	No	Lima
Macon, Dublin & Savannah	1	4-6-0	Freight	136,500	18 x 26	No	No	Baldwin
Magma Arizona	1	2-8-0		199,000	22 x 28			American
Magor Car Corp.	1	0-4-0	Switching	77,500	14 x 22	No	No	Baldwin
Mansfield Sheet & Tin Pl. Co.	1	0-4-0		79,000	14 x 22			American
Marsch, John, Inc.	4	0-6-0	Switching	94,600	17 x 24	No	No	Baldwin
Pickands, Mather & Co.	5	0-6-0	Switching	156,000	22 x 26	No	No	Lima
Mesaba Cliffs Iron Mining Co.	3	0-6-0	Switching		19 x 26			American
Michigan Central	10	0-8-0	Switching	219,000	25 x 28	No	No	Lima
	11	2-8-2	Freight	334,000	28 x 30	Yes	Yes	Lima
	5	4-6-2	Passenger	288,000	23 1/4 x 26	No	No	American
Midland Valley	3	2-8-2	Freight	199,500	22 x 28	No	No	Baldwin
Minarets & Western	3	2-8-2		250,000	24 1/4 x 28			American
	2	2-8-2		190,000	20 x 24			American
Minneapolis, St. Paul & S. Ste. Marie....	5	4-6-2	Passenger	163,000	25 x 26		No	American
Miranda Sugar Co.	2	2-8-0						Baldwin
Missouri, Kansas & Texas	5	4-6-2	Passenger	272,000	25 x 28	Oil	No	Lima
	40	2-8-2	Freight	315,000	28 x 30	Oil	No	Lima
	10	0-8-0	Switching	220,000	25 x 28	Oil	No	American
Missouri Pacific	4	2-8-2	Freight	327,000	27 x 32	Yes	Yes	American
	42	2-8-2	Freight	327,000	27 x 32	Yes	Yes	American
	4	4-8-2	Passenger	335,000	27 x 30	Yes	No	American
Mobile & Ohio	10	2-8-2	Freight	292,000	26 x 30	No	No	American
Montour	4	2-8-2	Freight	313,000	27 x 32	No	No	American
Mount Hood	1	2-8-2	Freight	139,000	18 x 24	No	No	Baldwin
Narragansett Pier	1	0-8-0						American
Nashville, Chattanooga & St. Louis	3	4-8-2	Passenger	327,000	27 x 30	Yes	No	Baldwin
	12	2-8-2	Freight	290,000	26 x 30	Yes	No	Baldwin
National Enameling Co.	1	0-6-0		141,000	21 x 26			American
National Lbr. & Mfg. Co.	1	2-6-2	Freight	148,800	18 x 24	No	No	Baldwin
New York Central	20	0-8-0	Switching	216,000	25 x 28	No	No	American
	36	0-8-0	Switching	216,000	25 x 28	No	No	Lima
	65	2-8-2	Freight	334,000	28 x 30	Yes	Yes	Lima
	57	2-8-2	Freight	334,000	28 x 30	Yes	Yes	American
	30	4-6-2	Passenger	286,500	23 1/4 x 26			American
New York, Chicago & St. Louis	15	2-8-2	Freight	307,000	26 x 30	Yes	No	Lima
	4	4-6-2	Passenger	242,000	22 1/4 x 26	No	No	Lima
New York, New Haven & Hartford	12	Electric	Passenger	362,000				Westinghouse
	20	0-8-0		216,000	25 x 28			American
New York, Ontario & Western	4	4-8-2	Passenger	317,000	27 x 28	Yes	No	American
Norfolk & Western	12	4-8-2	Passenger	352,000	28 x 30	Yes	No	Baldwin
	30	2-8-2	Freight	531,000	25 & 39 x 32	Yes	No	American
	4	2-8-2-2-8-2 Elec.	Freight Elec.	800,000				Amer.-Westingh'e
Norfolk Southern	5	2-8-0	Freight	191,430	22 x 28	No	No	Baldwin
North East Oklahoma	1	0-4-4-0 Elec.	Freight	100,000				Westinghouse
Northern Pacific	20	4-6-2	Passenger	314,000	26 x 28	No	No	American
	17	2-8-2	Freight	337,000	28 x 30	Yes	No	American
	8	2-8-2	Freight	337,000	28 x 30	Yes	Yes	American
	4	2-8-2	Freight	531,000	25 & 39 x 32	Yes	No	American
Northwestern Pacific	2	4-6-0	Passenger	180,000	20 x 28	Oil	No	Baldwin
	3	4-6-0	Freight	197,000	21 x 28	Oil	No	Baldwin
North River Coal & Wharf Co.	1	0-6-0	Switching	98,000	16 x 24	No	No	Baldwin
Osceola Cypress Co.	1	2-6-0		111,000	18 x 24			American
Oregon Short Line	2	2-8-8-0	Freight	494,500	26 & 41 x 32	Yes	No	American
Oregon-Washington R. R. & Nav. Co.	15	2-10-2	Passenger	370,200	29 1/4 x 30	Yes	No	Baldwin
	3	2-8-8-0	Freight	494,500	26 & 41 x 32	Yes	No	American
Orwell Iron Co.	2	0-6-0	Switching	160,000	22 x 26	No	No	Baldwin
Pacific Spruce Corp.	1	2-8-2	Freight	142,870	18 x 24	No	No	Baldwin
	1	2-6-2	Freight	122,000	17 x 24	No	No	Baldwin
Pacific States Lbr. Company	1	2-8-2	Freight	144,150	18 x 24	No	No	Baldwin
	1	2-6-2	Freight	132,270	18 x 24	No	No	Baldwin
	1	2-8-2	Freight	145,500	18 x 24	No	No	Baldwin
Pennsylvania-Ohio Elec.	1	0-4-0		65,000	14 x 22			American
Pennsylvania	100	2-10-0	Freight	371,000	30 1/2 x 32	Yes	Yes	Baldwin
	15	4-6-2	Passenger	308,890	27 x 28	No	No	Company shops
	2	2-8-2 Elec.	Passenger	400,000				Co. shop-West'se
	1	2-8-2 Elec.	Freight	400,000				Co. shop-West'se
Peoria & Pekin Union	6	0-6-0	Switching	168,000	21 x 26	No	No	Lima
Pere Marquette	20	0-8-0	Switching	206,000	22 x 28	No	No	American
Phelps, Dodge & Co.	2							Porter
Phenix Marble Co.	1	Geared		44,000				Heisler
Philadelphia & Reading	24	2-8-0	Freight	285,000	25 x 32	Yes	No	Baldwin
	1	2-8-0	Freight	285,000	25 x 32	Yes	Yes	Baldwin
	5	4-6-2	Passenger	273,600	25 x 28	No	No	Company shops
Pittsburgh, Lisbon & Western	1	2-8-0	Freight	146,000	20 x 24	No	No	Baldwin
Pittsburgh Plate Glass Co.	1	0-4-0		65,000	13 x 20			American
Pittsburgh Steel Co.	1		Switching					Baldwin
Polson Logging Co.	1	2-8-2	Freight	141,150	18 x 24	No	No	Baldwin
Public Service Co. of No. Ill.	1	0-4-0		99,000	16 x 24			American
Red River & Gulf	1	4-6-0	Freight	140,000	19 x 26	No	No	Baldwin
Richmond, Fred. & Potomac	1	0-8-0		230,000	24 x 28			American
	1	0-6-0		172,000	21 x 28			American
Riverside Portland Cement Co.	1	0-6-0		128,000	18 x 24			American
Robinson, Dwight P. & Co., Inc.	12	0-4-0						Baldwin
Ruggles & Rademaker	1	0-6-0	Switching	95,000	24 x 20	No	No	Baldwin
Ryan Car Company	1	0-6-0	Switching	105,000	18 x 24	No	No	Baldwin
St. Louis Coke & Chem. Co.	1	0-6-0		147,000	21 x 26			American
St. Louis-San Francisco	15	4-8-2	Passenger	351,700	28 x 28	Oil	No	Baldwin
	35	2-8-2	Freight	325,000	27 x 32	Oil	No	Baldwin
Sacramento Northern	2	4-0-4 Elec.	Frt. & Sw.	120,000				General Electric
San Antonio & Aransas Pass	4	4-4-0	Passenger	112,900	18 x 24	Oil	No	Baldwin
San Point Lbr. & Pole Co.	1	Geared		80,000				Heisler
San Francisco Belt Line	1							American
Seaboard Air Line	1	2-8-2		298,000	26 x 32			American
	1							Baldwin
	1							Lima
Sewell Valley	2	2-8-2	Freight	183,700	20 1/2 x 28	No	No	Baldwin
Shewlin-Hixon Co.	2	2-8-2	Freight	143,000	18 x 24	No	No	Baldwin
Sierra Ry. of California	1	2-6-2	Freight	98,250	15 x 24	No	No	Baldwin
Silver Falls Timber Co.	1	2-6-2	Freight	134,500	17 x 24	No	No	Baldwin
Snoqualmie Falls Lbr. Co.	1	2-6-2	Freight	155,000	18 x 24	No	No	Baldwin
Solvay Process Co.	2	0-4-0		65,000	13 x 20			American
Southern Pacific	9	4-6-2	Passenger	307,000	25 x 30	No	Yes	Baldwin
Southern Railway	15	2-8-2		288,000	26 x 30			American
	6	0-8-0	Switching	214,000	25 x 28	No	No	Baldwin
South San Francisco Belt Line	1	0-6-0		141,000	20 x 26			American
Standard Oil Co. of N. J.	4	0-6-0	Switching	110,000	19 x 24	No	No	Baldwin
Standard Slag Co.	1	0-4-0		99,000	16 x 24			American
Stange, A. H., Co.	1	2-6-2	Freight	106,620	16 x 24	No	No	Baldwin
Stewart Jones Co.	1	0-4-0		79,000	14 x 22			American
Stoddard Lumber Co.	1	Geared		80,000				Heisler
Studebaker Corp.	2	0-6-0		130,000	20 x 26			American

Purchaser	No.	Type	Service	Weight	Cylinders	Mech. stoker	Feed water heater	Builder
Superior Portland Cement Co.....	1	0-4-0	.....	53,000	12 x 18	...	...	American
Tavares & Gulf.....	2	2-6-2	.....	110,000	16 x 24	...	...	American
Temple Lumber Co.....	1	2-8-2	Freight	126,650	17 x 24	No	No	Baldwin
Tennessee, Alabama & Georgia.....	2	2-8-0	Freight	133,600	20 x 24	No	No	Baldwin
Tennessee Central.....	8	2-8-2	Freight	210,000	22 x 28	No	No	American
Tennessee Coal, Iron & R. R.....	2	2-8-0	.....	209,000	23 x 28	...	...	American
	1	0-6-0	.....	160,000	21 x 26	...	...	American
	1	4-6-4	.....	464,000	21 x 26	...	...	American
Tennessee Copper Co.....	1	0-6-0	.....	133,000	20 x 26	...	...	American
Texas & Pacific.....	8	4-6-2	Passenger	290,000	26 x 28	Oil	Yes	American
	8	0-6-0	Switching	165,000	21 x 28	Oil	No	American
Texas Gulf Sulphur Co.....	1	2-8-0	.....	163,000	21 x 28	...	...	American
Texas-Mexican.....	1	4-6-0	Passenger	137,100	19 x 26	Oil	No	Baldwin
Toledo, St. Louis & Western.....	5	2-8-0	Freight	201,000	22 x 28	No	No	Lima
	2	.....	Switching	.....	.....	...	...	Baldwin
Toledo Terminal.....	2	2-8-0	Freight	200,000	22 x 28	No	No	American
	1	0-6-0	Switching	142,000	20 x 26	No	No	American
Trout Creek Lumber Co.....	1	2-6-2	Freight	89,700	15 x 20	No	No	Baldwin
Union Oil Co.....	1	0-4-0	.....	99,000	16 x 24	...	...	American
Union Pacific.....	39	4-8-2	Passenger	345,000	29 x 28	Yes	No	American
	5	2-8-8-0	Freight	494,500	26 & 41 x 32	Yes	No	American
	18	2-10-2	.....	.....	.....	...	...	Baldwin
	37	2-10-2	.....	.....	.....	...	...	Lima
	18	2-10-2	.....	.....	.....	...	...	American
	5	Mallet	.....	.....	.....	...	...	American
Upper Merion & Plymouth.....	1	0-8-0	Switching	214,600	25 x 28	No	No	Baldwin
Utah Ry.....	1	2-10-2	Freight	375,206	29 1/4 x 30	Yes	Yes	Baldwin
U. S. Gypsum Co.....	1	0-6-0	.....	130,000	20 x 26	...	...	American
U. S. Metals Refining Co.....	1	0-6-0	Switching	121,130	18 x 24	No	No	Baldwin
	1	0-4-0	Switching	20,500	8 x 12	No	No	Baldwin
Universal Portland Cement Co.....	1	0-6-0	.....	142,000	20 x 26	...	...	American
Vacuum Oil Co.....	1	0-6-0	.....	160,000	21 x 26	...	...	American
Vance, J. A., Lumber Company.....	1	2-8-2	Freight	143,000	18 x 24	No	No	Baldwin
Vanderbilt Coal & Coke Co.....	1	Geared	.....	48,000	.....	...	...	Heisler
Wabash, Chester & Western.....	2	2-8-0	Freight	158,610	21 x 26	No	No	Baldwin
Warren Pipe & Foundry Co.....	1	0-4-0	.....	99,000	16 x 24	...	...	American
Warrenton.....	1	2-4-2	Pass. & Frt.	86,890	15 x 22	No	No	Baldwin
Washington & Old Dominion.....	1	0-4-4-0 Elec.	Freight	100,000	.....	...	...	Westinghouse
Waterman Fouke Lumber Co.....	1	2-6-2	Freight	85,500	15 x 20	No	No	Baldwin
Waterman Lumber Co.....	1	2-6-2	Freight	85,100	15 x 20	No	No	Baldwin
Wayne Coal Co.....	2	0-4-0	.....	43,000	11 x 16	...	...	American
Western Maryland.....	10	2-8-0	Freight	294,900	27 x 32	Yes	No	Baldwin
Western Pacific.....	6	2-8-2	Freight	315,000	28 x 30	No	No	American
West Penn Power Co.....	1	0-6-0	Switching	135,000	24 x 24	No	No	Porter
Wheeling Steel & Iron Co.....	1	0-6-0	.....	158,000	20 x 26	...	...	American
Wheeling Steel Corp.....	1	0-4-0	Switching	110,000	18 x 20	No	No	Baldwin
	1	0-6-0	.....	160,000	21 x 26	...	...	American
Wichita Falls & Southern.....	2	2-6-0	Freight	122,550	18 x 26	No	No	Baldwin
Winston & Co.....	1	2-6-2	.....	107,000	16 x 24	...	...	American
Winston Co.....	1	0-4-0	.....	42,000	11 x 16	...	...	American
Wisconsin & Michigan.....	2	4-6-0	Pass. & Frt.	182,000	21 x 28	No	No	Baldwin
Wynoches Timber Company.....	1	2-6-2	Freight	123,000	17 x 24	No	No	Baldwin
Yakima Valley Trans. Co.....	1	4-0-4 Elec.	Frt. & Sw.	100,000	.....	...	...	General Electric
Yosemite Valley.....	1	2-6-0	Pass. & Frt.	143,000	19 x 28	Oil	No	Baldwin
Youngstown & Ohio River.....	1	0-4-4-0 Elec.	Freight	100,000	.....	...	...	Westinghouse

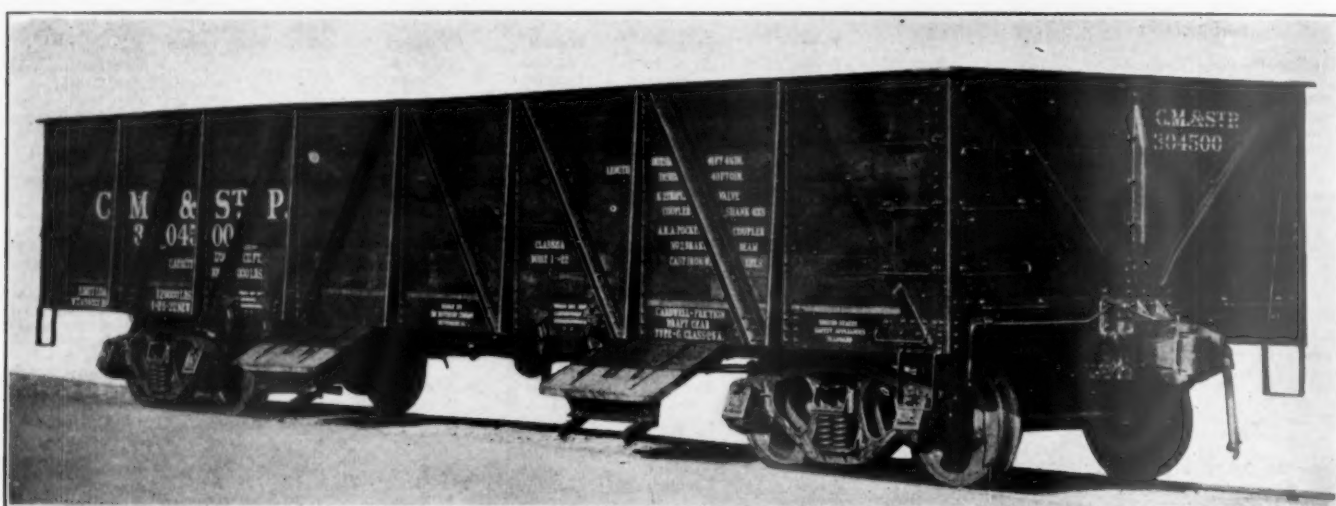
Orders for Export

Alexander & Baldwin, Ltd. (P. I.).....	1	0-4-0	.....	25,000	8 x 12	...	...	American
	1	4-6-2	.....	.....	.....	...	...	Baldwin
Argentine State Railways.....	8	4-8-2	.....	.....	.....	...	...	Baldwin
Atkins, E., & Co. (Cuba).....	2	2-6-0	.....	85,000	16 x 24	...	...	American
Beth. Chile Iron Mines.....	3	4-0-4 Elec.	Switching	120,000	.....	...	...	General Electric
Caldas Ry. (Columbia, S. A.).....	1	2-8-2	.....	105,000	16 x 22	...	...	American
Central America of Cuba.....	1	2-6-0	.....	111,000	17 x 24	...	...	American
Central of Brazil.....	1	4-6-2	.....	213,000	21 1/2 x 28	...	...	American
Chosen Ry. (Korea).....	6	4-6-2	.....	203,000	24 x 26	...	...	American
Czarnikow Rionda Co.....	1	2-8-0	.....	121,000	18 x 24	...	...	American
E. F. Araraquara (Brazil).....	2	2-8-2	.....	126,000	19 x 20	...	...	American
Hokkaido Kogyo Tetsudo (Japan).....	2	2-6-2	.....	.....	.....	...	...	Baldwin
Insp. Fed. Das Estrada for E. F. Cent. do Piahy (Brazil).....	1	0-6-0	.....	70,000	13 x 18	...	...	American
	1	2-8-0	.....	90,000	17 x 22	...	...	American
Korean Central.....	2	2-6-2	.....	.....	.....	...	...	Baldwin
Mexican Railway.....	10	0-4-4-0 Elec.	Pass. & Frt.	300,000	.....	...	...	{ American General Electric
Mitsui & Co.....	2	.....	.....	.....	.....	...	...	Porter
Mogyana Ry. (Brazil).....	1	4-6-2	.....	113,000	17 1/2 x 20	...	...	American
Norde Ry. of Spain.....	*6	0-6-0-0-6-0	Elec. Pass. & Frt.	184,000	.....	Electrical equipment only	.....	Westinghouse
Norton Griffith & Co. (Brazil).....	5	0-4-0	.....	29,000	9 x 14	...	...	American
Ulen Contracting Corp.....	1	0-4-0	Switching	13,900	6 x 10	No	No	Baldwin
	3	2-8-2	.....	84,000	15 x 20	...	...	American
	3	0-4-0	.....	29,000	9 x 14	...	...	American
	2	0-4-6	.....	.....	.....	...	...	Baldwin
	2	2-8-0	.....	.....	.....	...	...	Baldwin
Paris-Orleans (France).....	1	4-6-6-4 Elec.	.....	240,000	.....	...	...	{ American General Electric
Paris Orleans Railway.....	*120	0-4-4-0 Elec.	Freight	120,000	.....	Control equipment only	.....	Westinghouse
Patagonian Ry.....	25	2-8-2	.....	.....	.....	...	...	Baldwin
Polish State Railways.....	25	2-8-0	.....	.....	.....	...	...	Baldwin
Sorocabana Railway (Brazil).....	10	2-8-2	.....	129,000	19 x 20	...	...	American
E. S. Tubarao A. Ararangua (Brazil).....	1	2-8-2	.....	115,000	16 x 22	...	...	American
United Fruit Co.....	1	2-8-2	Switching	.....	.....	...	...	Baldwin
	1	0-6-0	Switching	.....	.....	...	...	Baldwin
United Railways of Yucatan.....	2	4-4-0	Passenger	57,000	13 x 18	No	No	Baldwin
United Sugar Companies of S. A.....	1	2-8-2	.....	.....	.....	...	...	Baldwin
Villa Yon Atocha (Argentina).....	1	2-8-2	.....	155,000	21 x 24	...	...	American
Villa Yon Atocha (Bolivia).....	1	2-8-2	.....	155,000	21 x 24	...	...	American

*Not included in total.

Canada

Abitibi Power & Paper Co.....	1	2-6-0	.....	141,000	19 x 26	...	...	American
Brunner Mond Canada Co.....	1	Shay	.....	.....	.....	...	...	Lima
Canadian National.....	35	Geared	.....	72,000	.....	...	...	Heisler
	16	2-8-2	.....	315,000	27 x 30	...	...	American
	10	4-8-2	.....	.....	.....	...	...	Canadian
	1	2-8-2	.....	.....	.....	...	...	Canadian
Crows Nest Pass Lumber Co.....	1	Geared	.....	126,000	.....	...	...	Heisler
Denaston Brakey.....	1	0-4-0	.....	79,000	14 x 22	...	...	American
St. Lawrence Brick Co.....	1	0-4-0	.....	29,000	9 x 14	...	...	American
Smith, John B., & Son.....	1	0-4-0	.....	65,000	13 x 20	...	...	American



A 40-ft. Gondola Car of 100,000 lb. Capacity for the Chicago, Milwaukee & St. Paul

Freight Car Orders Eight Times 1921 Figure

Total for 1922 Exceeded Only Twice Since 1906—Carriers at Last Begin to Make Up Deferred Requirements

THE FREIGHT cars ordered during 1922 for service in the United States reached a total of 180,154. This was the largest total reported in any year since 1912. With two exceptions it was the largest number of cars reported in any year since 1906, the two exceptions being 1909, in which year 189,360 cars were ordered, and 1912, in which year the orders totaled 234,758.

The true significance of the 1922 figures is contained, however, in the fact that the 1922 total was nearly eight

times the figure of 23,346 reported for 1921, or in the fact that 1922 is the first year since 1918 in which orders topped the 100,000 mark. This means that in 1922 the railways at last found themselves in a position to take steps to remedy

characterized is apparently to be continued well into 1923. At least this is the conclusion one must come to if the amount of buying which continued up to the end of December is taken as any criterion.

In an article entitled, "Railway Facilities Expansion Behind Traffic Growth," which will be found on another page

TABLE I—FREIGHT CAR ORDERS OF 1921

For service in the United States.....	180,154
For service in Canada.....	746
For export to other countries.....	1,072
Grand total.....	181,972

times the figure of 23,346 reported for 1921, or in the fact that 1922 is the first year since 1918 in which orders topped the 100,000 mark. This means that in 1922 the railways at last found themselves in a position to take steps to remedy

TABLE II—ORDERS FOR FREIGHT CARS SINCE 1901

Domestic orders			
Year	Freight cars	Year	Freight cars
1901.....	193,439	1908.....	62,669
1902.....	195,248	1909.....	189,360
1903.....	108,936	1910.....	141,024
1904.....	136,561	1911.....	133,117
1905.....	341,315	1912.....	234,758
1906.....	310,315	1913.....	146,732
1907.....	151,711	1914.....	80,264

Domestic and foreign			
Year	Domestic	Canadian	Total
1915.....	109,792	18,222	128,014
1916.....	170,054	35,314	205,368
1917.....	79,367	53,191	132,558
1918.....	114,113	9,657	123,770
1919.....	22,062	3,837	25,899
1920.....	84,207	12,406	96,613
1921.....	23,346	30	23,376

Prior to 1918 Canadian orders included in domestic.

the shortage of freight car facilities with which they have now been confronted for a period of several years.

In addition to this factor the most favorable feature in the situation is that the buying movement by which 1922 was

TABLE III—FREIGHT CARS BUILT IN 1921

	United States	Canada	Total
Domestic	66,289	458	66,747
Foreign	1,126	100	1,226
	67,415	558	67,973

Comparison with Previous Years

Year	Freight		
	Domestic	Foreign	Total
1899.....	117,982	1,904	119,886
1900.....	113,070	2,561	115,631
1901.....	132,591	4,359	136,950
1902.....	161,747	2,800	164,547
1903.....	153,195	1,613	154,808
1904.....	60,955	1,995	62,950
1905*.....	162,701	5,305	168,006
1906*.....	236,451	7,219	243,670
1907*.....	280,216	9,429	289,645
1908*.....	75,344	1,211	76,555
1909*.....	91,077	2,493	93,570
1910*.....	176,374	4,571	180,945
1911*.....	68,961	3,200	72,161
1912†.....	148,357	4,072	152,429

* Includes Canadian output.

† Includes Canadian output and equipment built in company shops.

	United States			Canadian			Grand Total
	Domestic	Foreign	Total	Domestic	Foreign	Total	
1913.....	176,049	9,618	185,667	22,017	.....	22,017	207,684
1914.....	97,626	462	98,088	6,453	.....	6,453	104,541
1915.....	58,226	11,916	70,142	1,758	2,212	3,970	74,112
1916.....	111,516	17,905	129,421	.....	.....	5,580	135,001
1917.....	115,705	23,938	139,643	3,658	8,100	11,758	151,401
1918.....	67,063	40,981	108,044	14,704	1,960	16,664	124,708
1919.....	94,981	61,783	156,764	6,391	30	6,421	163,185
1920.....	60,955	14,480	75,435	.....	.....	.....	.....
1921.....	40,292	6,412	46,704	8,404	745	9,149	55,853

of this issue, an analysis is made of the relationship between the growth of traffic and the growth of railway facilities in the years from 1900 to 1921. In addition to various other details this article points out that the number of freight cars and the total freight car capacity has lagged very much behind the expansion of railway traffic. This condi-

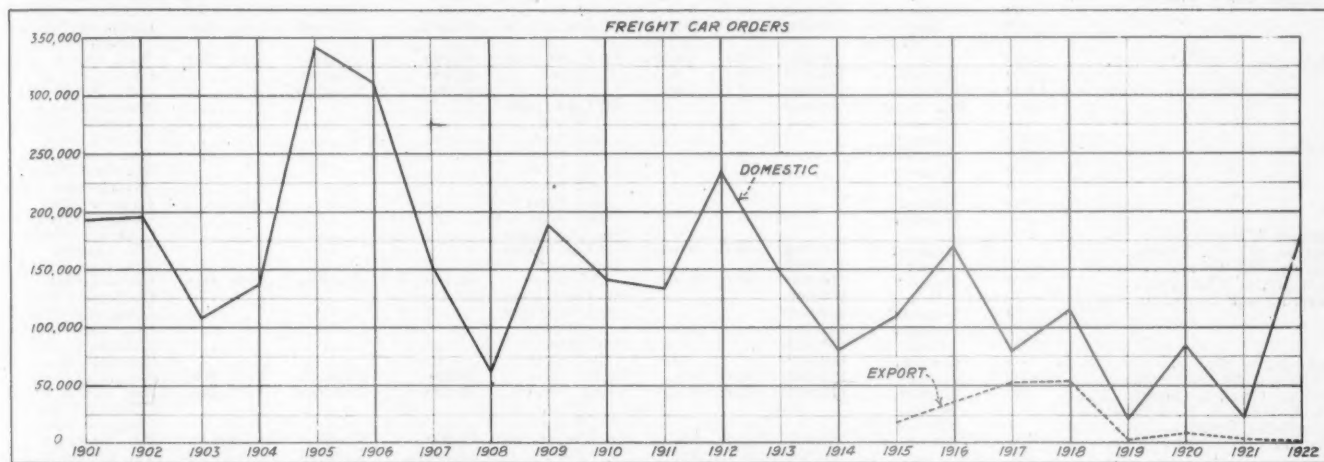
tion has been particularly emphasized during the past few years, because in these years the railways have not been able to keep up with ordinary retirements, a factor which is shown by the fact that while the number of freight cars on the Class I roads at the end of 1918 totaled 2,325,673, or at the end of 1919, 2,361,102, at the end of 1921 they totaled only 2,315,700, or 10,000 less than at the end of 1918. The situation as shown in the figures of tons of freight car capacity does not appear quite as bad, but at the end of 1918 the figure was 96,766,585; at the end of 1919, 99,001,041, whereas at the end of 1921 it was but 98,531,652, an increase over 1918 but a decrease from 1919. This adverse situation has been especially aggravated during the past two years because of the excessive number of unserviceable cars. The article in question shows that because of the excess of bad order cars over normal, the railways had to handle their peak business in October, 1922, with approximately 110,000 less serviceable cars than they had available in the peak month of August, 1920, or 100,000 cars less than they had available in October, 1918, which was another month of peak traffic.

These conditions in 1922, combined with the sudden expansion of traffic following the end of the coal strike and

the railways to take a long step towards remedying a severe situation which would have rapidly become much worse with any increase in traffic had it not been remedied.

The freight car buying movement began much earlier in 1922 than did the buying movement of locomotives and the indication was that it was the result of a realization of a much more serious shortage than was the case with locomotives. As in the case of locomotives, it has been assisted by more favorable prices and similarly during the period during which it has lasted nearly every important railroad has placed large orders, with the exception, however, of one very important system, the Pennsylvania. Similarly also the buying movement has continued and, as already noted, bids fair to extend well into 1923.

The freight car production in 1922 totaled 66,289 cars for domestic service in the United States. This compared with 40,292 in 1921, with 60,955 in 1920 and with 94,981 in 1919. Comparison with previous years will show that the 1922 production was much below the average. The reason for this was first the small orders in 1921, there being but a small amount of business carried over into 1922. Another reason was a slowness on the part of the car builders in getting into production, a situation which was aggravated



Flotting the Figures Shown in Table II on Page 130

the handicaps resulting from the strike of railway shopmen, gave the railways a problem which they were unable to meet to the satisfaction of the shipper or the public generally. The measure of this difficulty was a car shortage which, at its worst, namely between October 23 and 31, averaged 179,239 cars. The bad order car situation has since been remedied. Throughout most of 1922 the bad order car percentage averaged about 14 per cent. At its worst, on August 1, the total number of unserviceable cars was, according to the Car Service Division reports, 345,013, or 15.3 per cent of the total cars on line. The total has since been substantially reduced; on December 1, the number was 226,288, or 9.9 per cent. The normal percentage should be nearer 5 or 5.5 per cent.

It was conditions such as these which emphasized to the railways the necessity of adding to their car supply. There was also the expectation that heavier traffic was to be expected with the end of the coal strike and with the general revival of business which is expected to continue well into the year 1923. The remedy of the unfavorable freight car situation has been sought in the great amount of repair work which has been a feature of equipment builders shops during the year and in the placing of large orders for new cars. The net income of the railways in 1922 was not as favorable as could have been desired, or as it would unquestionably have been without the coal strike and then the shopmen's strike. It was, however, sufficiently favorable to enable

in some measure by the difficulty of securing steel due to the coal strike and later due to delayed transportation, resulting from the shopmen's strike. There is also the fact that the orders placed later in the year have not yet been filled but are carried over into 1923. It seems altogether likely that the purchases of freight cars will reach fair figures during 1923, which will mean a much better production for this year than was reported for last.

A disappointing feature is the export business, orders in 1922 totaling only 1,072, and production only 1,226. It is to be hoped that better financial conditions throughout the world will allow a gradual improvement in this business. At present we seem to be below pre-war levels. One hesitates to believe that the United States is going to prove unable to hold at least a fair share of the increased export business in railway supplies which it secured as a result of the war.

The list of orders which follows is compiled from information furnished the *Railway Age* by the railroads and private car lines in response to requests for this information. The information was then checked against lists of orders furnished by the car builders or against the weekly reports which have appeared in the weekly Equipment and Supplies columns of the *Railway Age*. The figures of production are secured in a similar manner. The editors of the *Railway Age* are especially indebted to the Railway Car Manufacturers' Association for assistance in securing the reports of

the members of that organization. The *Railway Age* is not sufficiently optimistic as to believe that the lists can include all of the orders placed or that the production totals are of scientific accuracy, but it is believed that such omissions

as occur will be found to be small and unimportant and will not vitiate the value of the figures, particularly as concerns comparisons with preceding years which, after all, is the primary purpose of the compilations.

Freight Car Orders in 1922

For Service in the United States

Purchaser	No.	Class	Capacity	Length	Construction	Weight	Draft gear	Trucks	Builder
Abilene & Southern.....	3	Caboose	.....	36 ft. 0 in.	St. Und'frame	44,000	Friction	St. Side Fr.	Company Shops
Akron, Canton & Y'gstown....	4	Dump	80,000	26 ft. 0 in.	St. Und'frame	44,000	Friction	St. Side Fr.	Company Shops
Alabama & Vicksburg.....	25	Box	60,000	37 ft. 11 in.	All Steel	48,500	Spring	Arch Bar	Kilbourne & Jacobs
	100	Flat	80,000	40 ft. 0 in.	Wood	34,800	Friction	Arch Bar	Am. Car & Fdy.
	15	Box	60,000	36 ft. 0 in.	Wood	29,700	Friction	Arch Bar	Company Shops
	11	Coal	80,000	35 ft. 5 in.	Wood	34,500	Friction	Arch Bar	Company Shops
	12	Tank	10,050g.	.....	.....	35,000	Friction	Arch Bar	Company Shops
American Oil Co.....	5	Tank	8,050	.....	.....	.....	Friction	Arch Bar	Standard Tank
American Ref. Co.....	5	Refrigerator	60,000	40 ft. 0 in.	St. Und'frame	.....	Friction	Arch Bar	Standard Tank
Amer. Refr. Transit Co.....	2,000	Box	100,000	40 ft. 0 in.	St. Und'frame	39,400	Friction	St. Side Fr.	Am. Car & Fdy.
Ann Arbor.....	1	.....	.....	.....	.....	.....	.....	.....	Company Shops
Arkansas & Louisiana, Mo....	2	Refrigerator	80,000	39 ft. 11 3/4 in.	St. Und'frame	55,500	Friction	St. Side Fr.	Company Shops
Atchison, Topeka & Santa Fe.	1,000	Refrigerator	80,000	39 ft. 11 3/4 in.	St. Und'frame	55,500	Friction	St. Side Fr.	Pullman
	1,000	Furniture	80,000	40 ft. 6 in.	St. Und'frame	51,000	Friction	St. Side Fr.	Am. Car & Fdy.
	1,000	Box	80,000	40 ft. 6 in.	St. Und'frame	46,000	Friction	St. Side Fr.	Pullman
	1,000	Box	80,000	40 ft. 6 in.	St. Und'frame	46,000	Friction	St. Side Fr.	Am. Car & Fdy.
	1,000	Box	80,000	40 ft. 6 in.	St. Und'frame	46,000	Friction	St. Side Fr.	Pullman
	500	Stock	80,000	40 ft. 0 in.	St. Und'frame	46,000	Friction	St. Side Fr.	Standard Steel
	500	Gondola	100,000	40 ft. 0 in.	St. Und'frame	47,000	Friction	St. Side Fr.	Pullman
	500	General Service	100,000	.....	St. Und'frame	.....	.....	.....	Pullman
Atlanta & West Point.....	50	.....	.....	.....	.....	.....	.....	.....	Am. Car & Fdy.
Atlanta, Birmingham & Atlantic	200	.....	.....	.....	.....	.....	.....	.....	Company Shops
Atlantic Coast Line.....	2,700	Box	80,000	40 ft. 6 in.	St. Und'frame	43,000	Friction	St. Side Fr.	Company Shops
	100	Phosphate	100,000	33 ft. 0 in.	All Steel	.....	Friction	St. Side Fr.	Standard Tank
	1,000	Box	60,000	36 ft. 0 in.	St. Und'frame	45,000	Friction	Arch Bar	Chickasaw Ship.
	*500	St. Un'fr. & S.	80,000	43 ft. 2 3/4 in.	St. Und'frame	46,000	Friction	Arch Bar	Company Shops
Baltimore & Ohio.....	1,000	Box	80,000	43 ft. 2 3/4 in.	St. Und'frame	46,000	Friction	Arch Bar	Standard Tank Car
	1,000	Gondola	140,000	48 ft. 7 in.	Steel	51,400	Friction	.....	Balt. Car & Fdy.
	1,000	Gondola	100,000	31 ft. 5 in.	Steel	41,000	Friction	.....	Cambria
	1,000	Box Body	80,000	.....	St. Und'frame	.....	.....	.....	Am. Car & Fdy.
	41	Caboose	.....	.....	Wood	.....	.....	.....	Standard Steel
	1,500	Hopper	.....	.....	All Steel	.....	.....	.....	Company Shops
	1,000	Hopper	.....	.....	All Steel	.....	.....	.....	Pressed Steel
	500	Hopper	.....	.....	All Steel	.....	.....	.....	Am. Car & Fdy.
	500	Hopper	.....	.....	All Steel	.....	.....	.....	Standard Steel
	500	Hopper	.....	.....	All Steel	.....	.....	.....	Youngstown Steel
	500	Hopper	.....	.....	All Steel	.....	.....	.....	Ralston Steel
	1,000	Gondola	.....	.....	All Steel	.....	.....	.....	Cambria Steel
Bangor & Aroostook.....	250	.....	.....	.....	St. Und'frame	.....	.....	.....	Company Shops
Barnes, Al. G., Circus.....	1	Elephant	80,000	40 ft. 0 in.	St. Und'frame	.....	.....	.....	Mt. Vernon
Beacon Oil Co.....	50	Tank	8,000g.	.....	.....	.....	.....	.....	Am. Car & Fdy.
Belt Ry. of Chicago.....	100	Hopper	110,000	30 ft. 6 in.	All Steel	44,100	Friction	Arch Bar	Pressed Steel
Birmingham Southern.....	20	Box	100,000	.....	St. Und'frame	.....	.....	.....	Chickasaw Ship.
	10	Gondola	100,000	.....	St. Und'frame	.....	.....	.....	Chickasaw Ship.
	35	Gondola	140,000	.....	Steel	.....	.....	.....	Chickasaw Ship.
	25	Coal	140,000	.....	Steel	.....	.....	.....	Chickasaw Ship.
Blaw-Knox Co.....	6	Gondola	140,000	.....	All Steel	.....	.....	.....	Standard Steel
Buffalo & Susquehanna.....	200	Hopper	110,000	30 ft. 6 in.	All Steel	36,000	Friction	Arch Bar	Standard Steel
Buffalo Creek & Gauley.....	300	Hopper	110,000	32 ft. 0 in.	All Steel	37,000	Friction	Arch Bar	Am. Car & Fdy.
Calif. West. R. R. & Nav. Co.	2	Ballast	.....	.....	Wood	.....	.....	.....	Company Shops
Campbell's Creek.....	1	Caboose	.....	.....	.....	.....	.....	.....	Company Shops
Central of Georgia.....	500	Vent. Box	80,000	40 ft. 0 3/4 in.	St. Und'frame	45,800	Friction	St. Side Fr.	Mt. Vernon
	100	Flat	80,000	40 ft. 4 in.	St. Und'frame	31,500	Friction	St. Side Fr.	Va. Bridge & Iron
Central of New Jersey.....	1	.....	.....	.....	.....	.....	.....	.....	Company Shops
Central Vermont.....	4	Caboose	.....	.....	St. Und'frame	.....	.....	.....	Am. Car & Fdy.
Champlin Ref. Co.....	500	Tank	8,050g.	.....	.....	.....	.....	.....	Penn. Tank
Charleston & Western Car....	100	Box	80,000	36 ft. 0 in.	St. Und'frame	43,000	Friction	St. Side Fr.	Standard Tank
Chesapeake & Ohio.....	1,870	Box	80,000	36 ft. 0 in.	St. Und'frame	.....	Friction	St. Side Fr.	Am. Car & Fdy.
	500	Vent. Box	80,000	36 ft. 0 in.	St. Und'frame	.....	Friction	St. Side Fr.	Newport News
	50	Refrigerator	80,000	39 ft. 7 3/4 in.	St. Und'frame	.....	Friction	St. Side Fr.	Am. Car & Fdy.
	1,509	Gondola	115,000	30 ft. 0 in.	All Steel	.....	Friction	St. Side Fr.	Newport News
	1,509	Gondola	115,000	41 ft. 0 in.	All Steel	.....	Friction	St. Side Fr.	Pullman
Chicago & North Western....	245	Stock	80,000	36 ft. 0 in.	St. Und'frame	44,800	Friction	St. Side Fr.	Am. Car & Fdy.
	625	Box	80,000	40 ft. 6 in.	St. Und'frame	44,800	Friction	St. Side Fr.	Western S. C. & F.
	260	Refrigerator	80,000	33 ft. 4 3/4 in.	St. Und'frame	60,500	Friction	St. Side Fr.	Standard Steel
	260	Stock	80,000	36 ft. 6 in.	St. Und'frame	40,600	Friction	St. Side Fr.	Am. Car & Fdy.
	250	Stock	80,000	36 ft. 6 in.	St. Und'frame	42,600	Friction	St. Side Fr.	Pullman
	250	Gondola	100,000	41 ft. 1 1/2 in.	St. Und'frame	45,400	Friction	St. Side Fr.	Pullman
	800	Gondola	100,000	41 ft. 1 1/2 in.	St. Und'frame	45,400	Friction	St. Side Fr.	General American
	510	Flat	100,000	42 ft. 1 1/2 in.	St. Und'frame	38,500	Friction	St. Side Fr.	Western S. C. & F.
	200	Flat	100,000	42 ft. 1 1/2 in.	St. Und'frame	38,500	Friction	St. Side Fr.	General American
	300	Ballast	100,000	40 ft. 10 in.	St. Und'frame	49,300	Friction	St. Side Fr.	Rodger
	800	Ore	100,000	19 ft. 4 in.	All Steel	34,400	Friction	St. Side Fr.	Pullman
	50	Tank	10,000g.	.....	St. Und'frame	46,500	Friction	St. Side Fr.	Gen. Am. Tk. Car
Chicago, Burlington & Quincy.	500	Box	80,000	40 ft. 6 in.	Steel Frame	42,500	Friction	Arch Bar	Pullman
	500	Box	80,000	40 ft. 6 in.	Steel Frame	42,500	Friction	Arch Bar	Mt. Vernon
	500	Box	80,000	40 ft. 6 in.	Steel Frame	42,500	Friction	Arch Bar	General American
	500	Automobile	80,000	40 ft. 6 in.	Steel Frame	44,000	Friction	Arch Bar	Pullman
	400	Refrigerator	60,000	33 ft. 2 3/4 in.	St. Und'frame	56,000	Friction	Arch Bar	Pullman
	400	Refrigerator	60,000	33 ft. 2 3/4 in.	St. Und'frame	56,000	Friction	Arch Bar	Am. Car & Fdy.
	200	Refrigerator	60,000	33 ft. 2 3/4 in.	St. Und'frame	56,000	Friction	Arch Bar	General American
	500	Stock	80,000	36 ft. 1 3/4 in.	Steel Frame	35,800	Friction	Arch Bar	Am. Car & Fdy.
	1,000	Gondola	100,000	41 ft. 6 in.	Composite	41,400	Friction	St. Side Fr.	Western S. C. & F.
	500	Gondola	100,000	41 ft. 6 in.	Composite	41,200	Friction	St. Side Fr.	Pullman
	500	Gondola	100,000	41 ft. 6 in.	Composite	41,200	Friction	St. Side Fr.	Am. Car & Fdy.
Chicago Great Western.....	500	Box	80,000	40 ft. 0 in.	St. Cent. Sills	.....	Spring	Arch Bar	Pullman
Chicago, Ind. & Louisville....	300	Gondola	100,000	41 ft. 6 in.	Composite	.....	Friction	St. Side Fr.	Pullman
	10	Refrigerator	60,000	33 ft. 6 3/4 in.	St. Und'frame	57,600	Friction	.....	Pullman
	300	.....	100,000	.....	Steel Frame	.....	.....	.....	Company Shops
Chic., Milwaukee & St. Paul..	1,000	Box	80,000	40 ft. 0 in.	St. Und'frame	42,600	Friction	St. Side Fr.	Pullman
	3,000	Box	80,000	40 ft. 0 in.	St. Und'frame	42,600	Friction	St. Side Fr.	Western S. C. & F.
	1,500	Box	80,000	40 ft. 0 in.	St. Und'frame	42,600	Friction	St. Side Fr.	Bettendorf
	1,000	Coal	100,000	40 ft. 0 in.	St. Und'frame	45,300	Friction	St. Side Fr.	Western S. C. & F.
	1,000	Coal	100,000	40 ft. 0 in.	St. Und'frame	45,300	Friction	St. Side Fr.	Pullman
	3,000	Coal	100,000	40 ft. 0 in.	St. Und'frame	45,300	Friction	St. Side Fr.	Bettendorf
	500	Automobile	80,000	40 ft. 0 in.	St. Und'frame	40,400	Friction	St. Side Fr.	General American
	125	Gondola	16,000	.....	Steel	.....	.....	.....	Bettendorf
Chi., N. Y. & Bos. Refr. Desp.	250	Refrigerator	80,000	40 ft. 6 in.	St. Und'frame	40,400	Friction	St. Side Fr.	General American
Chic., Rock Island & Pacific..	500	Coal	100,000	41 ft. 0 in.	St. Und'frame	46,000	Friction	St. Side Fr.	Am. Car & Fdy.
	500	Box	80,000	40 ft. 0 in.	St. Und'frame	42,500	Friction	St. Side Fr.	Western S. C. & F.
Chic., St. P., Minn. & Omaha.	100	Hart Conv.	100,000	30 ft. 0 in.	St. Und'frame	49,700	Friction	.....	Rodger
	2	Caboose	.....	.....	St. Und'frame	.....	.....	.....	Company Shops

Purchaser	No.	Class	Capacity	Length	Construction	Weight	Draft gear	Trucks	Builder
Choctaw Lumber Co.	15	Logging	80,000	40 ft. 0 in.	St. Und'frame	34,600	Spring	.....	Chickasaw Ship.
Cincinnati, Ind. & Western	207	Gondola	100,000	41 ft. 6 in.	St. Und'frame	42,000	Friction	St. Side Fr.	Am. Car & Fdy.
Cincinnati Northern	250	Automobile	80,000	30 ft. 6 in.	All Steel	40,700	Friction	St. Side Fr.	Am. Car & Fdy.
Clark Car Co.	750	Hopper	110,000	40 ft. 6 in.	All Steel	43,700	Friction	St. Side Fr.	Pullman
Cleve., Cin., Chic. & St. Louis	100	Dump	100,000	32 ft. 1 1/2 in.	All Steel	58,144	Friction	.....	Cambria Steel
	2,057	Hopper	110,000	30 ft. 6 in.	All Steel	41,300	Friction	St. Side Fr.	Am. Car & Fdy.
	2,000	Box	100,000	40 ft. 7 in.	All Steel	47,400	Friction	St. Side Fr.	Am. Car & Fdy.
Colorado & Southern	2				St. Und'frame				Company Shops
	200	Refrigerator	60,000	33 ft. 2 3/4 in.	St. Und'frame	56,500	Friction	Arch Bar	General American
	1,000	Gondola	100,000	40 ft. 0 in.	All Steel	43,600	Friction	St. Side Fr.	Bettendorf
Commonwealth Steel Co.	14				Wood				Company Shops
Cornwall R. R.	12	Hopper	180,000	20 ft. 5 in.	All Steel	45,000	Friction	.....	Pullman
Cowlitz, Chehalis & Cascade	10	Ore Body	100,000		Steel				Standard Steel
Cudahy Packing Co.	200	Logging							Pac. Car & Fdy.
Delaware, Lack. & Western	370	Refrigerator							Company Shops
Denver & Rio Grande Westn.	700	Gondola	80,000	40 ft. 0 in.	Steel Frame	42,000	Friction	St. Side Fr.	Am. Car & Fdy.
Derby Oil Co.	5	Gondola	140,000	46 ft. 3 in.	All Steel		Friction	St. Side Fr.	Western S. C. & F.
	5	Tank	6,000g.	27 ft. 4 1/2 in.	All Steel	41,100		Arch Bar	Standard Tank
	6	Tank	8,000g.	31 ft. 6 1/2 in.	All Steel	44,500		Arch Bar	Standard Tank
Detroit Edison Co.	35	Gondola	100,000						Pressed Steel
Dold, Jacob, Packing Co.	20	Refrigerator							Company Shops
Donora Southern	3	L. S. Gondola			St. Und'frame				Company Shops
East Jersey R. R. & Ter. Co.	112	Tank	80,000		All Steel	36,000	Friction	.....	Am. Car & Fdy.
	2	Tank	100,000	32 ft. 6 in.	All Steel		Friction	.....	Am. Car & Fdy.
Eastman Chemical Corp.	1	Tank	6,000g.						Gen. Am. Tk. Car
Ea. Tenn. & West. No. Car.	5				Wood				Company Shops
Electro Bleaching Gas Co.	*80	Steel Un'frames	30,000						Gen. Am. Tk. Car
Elgin, Joliet & Eastern	200	Dump Bodies							General American
	*300	Steel Un'frames							J. W. Heggie
Elk Refining Co.	5	Tank	6,000g.	31 ft. 9 in.	All Steel	39,600	Friction	Arch Bar	J. W. Heggie
El Paso & Southwestern	20	Refrigerator	60,000	39 ft. 11 1/2 in.	St. Und'frame	57,600	Friction	Arch Bar	Standard Tank
Erie	50	Caboose			St. Und'frame				Pullman
Florida East Coast	175	Refrigerator	80,000	42 ft. 0 in.	St. Und'frame		Friction	St. Side Fr.	Company Shops
	30	Tank	100,000	32 ft. 6 in.	All Steel		Friction	St. Side Fr.	Gen. Am. Tk. Car
	10	Caboose	60,000	39 ft. 0 in.	St. Und'frame		Friction	St. Side Fr.	Mt. Vernon
Ford Motor Co.	500	Hopper	110,000	30 ft. 6 in.	All Steel	40,860	Friction		Cambria Steel
	500	Hopper	110,000		Steel				Standard Steel
Ft. Pitt. Bridge Co.	6	Gondola	140,000		All Steel				Standard Steel
Fort Smith & Western	1				St. Und'frame				Company Shops
Ft. Worth & Denver City	500	Box	80,000	40 ft. 6 in.	Steel Frame	42,400	Friction	Arch Bar	Company Shops
Francis, P. E., Co.	100	Refrigerator	60,000	33 ft. 2 3/4 in.	St. Und'frame	55,600	Friction	Arch Bar	Mt. Vernon
Fruit Growers Express	4	Hopper	80,000	30 ft. 0 in.	All Steel				Am. Car & Fdy.
	100	Refrigerator							Mt. Vernon
	*1,000	Steel Un'frames							Company Shops
General Petroleum Corp.	3	Tank	10,000g.						General American
Georgia	10				St. Und'frame				Penn. Tank
	96				Wood				Company Shops
Gillespie & Sons	10	Tank	100,000		All Steel	44,000	Friction	Arch Bar	Company Shops
Glenn Nina Tank Line	5	Tank					Friction	Arch Bar	Am. Car & Fdy.
Goodrich, Wm. O., Co.	1	Tank	8,050g.				Friction	Arch Bar	Standard Tank
Goodwin-Gallagher Sand & G. Co.	6	Hopper	40,000				Friction	Arch Bar	Standard Tank
Great Northern	500	Gondola	100,000	40 ft. 0 in.	All Steel	44,300	Friction	St. Side Fr.	Magor
	500	Refrigerator	60,000	39 ft. 1 1/2 in.	Wood	53,800	Spring	St. Side Fr.	Pressed Steel
	500	Stock	80,000	36 ft. 10 1/2 in.	Steel Frame	37,400	Friction	Arch Bar	General American
	300	Logging	100,000	40 ft. 0 in.	All Steel	31,400	Spring	Arch Bar	Pullman
	750	Ore							Company Shops
	750	Ore							Pressed Steel
Great Southern Ref. Co.	50	Tank	10,050g.				Friction	Arch Bar	Cambria Steel
	28	Tank	8,050g.				Friction	Arch Bar	Standard Tank
	4	Tank	6,050g.				Friction	Arch Bar	Standard Tank
Grey Steel Prod. Co.	2	Hopper	110,000						Pressed Steel
Gulf & Sabine River	1				Wood				Company Shops
Gulf, Mobile & Northern	200	Box	80,000	46 ft. 0 in.	St. Und'frame			Arch Bar	Am. Car & Fdy.
	100	Box	60,000	35 ft. 10 in.	Wood			Arch Bar	Anniston Elec.
	50	Gondola	80,000	36 ft. 6 in.	Wood			Arch Bar	Anniston Elec.
Gulf Refining Co.	200	Tank	80,000		Steel				Standard Steel
	50	Tank	120,000		Steel				Standard Steel
Hercules Gasoline Co.	10	Tank	10,050g.				Friction	Arch Bar	Standard Tank
Illinois Central	500	Coal	100,000	46 ft. 0 3/4 in.	St. Und'frame	49,800	Friction	St. Side Fr.	Am. Car & Fdy.
	1,700	Gondola	100,000	40 ft. 10 1/2 in.	St. Und'frame	47,200	Friction	St. Side Fr.	Pullman
	900	Gondola	100,000	40 ft. 10 1/2 in.	St. Und'frame	47,200	Friction	St. Side Fr.	Western S. C. & F.
	400	Gondola	100,000	40 ft. 10 1/2 in.	St. Und'frame	47,200	Friction	St. Side Fr.	Standard Steel
	500	Gondola	100,000	40 ft. 10 1/2 in.	St. Und'frame	47,200	Friction	St. Side Fr.	Mt. Vernon
	500	Gondola	100,000	40 ft. 10 1/2 in.	St. Und'frame	47,200	Friction	St. Side Fr.	Am. Car & Fdy.
	500	Gondola	100,000	40 ft. 10 1/2 in.	St. Und'frame	47,200	Friction	St. Side Fr.	Bettendorf
	75	Caboose	60,000	27 ft. 5 1/2 in.	St. Und'frame	38,500	Friction	St. Side Fr.	Am. Car & Fdy.
Interstate R. R.	1,000	Hopper	110,000	30 ft. 5 in.	All Steel		Friction	Arch Bar	Pressed Steel
Kansas City Southern	4	Tank	8,050g.				Friction	Arch Bar	Standard Tank
King Chemical Co.	1	Tank							Gen. Am. Tk. Car
Lake Champlain & Moriah	12	Hopper	100,000	23 ft. 3 1/2 in.	All Steel	41,000	Spring		Pressed Steel
	10	Ore	100,000	22 ft. 1/2 in.	All Steel	36,500	Friction		Pressed Steel
Lehigh & New England	100	Gondola	100,000	41 ft. 9 in.	St. Und'frame				Magor
	7				St. Und'frame				Company Shops
Live Poultry Transit Co.	350	Poultry		36 ft. 0 in.	All Steel	49,000	Friction	St. Side Fr.	Am. Car & Fdy.
Long Island	10	Caboose		23 ft. 3 3/4 in.	St. Und'frame	35,600	Friction	Arch Bar	Am. Car & Fdy.
Los Angeles & Salt Lake	5	Caboose		29 ft. 7 in.	St. Und'frame	36,370	Friction	St. Side Fr.	Mt. Vernon
Louisiana Ry. & Nav. Co.	36	Ballast	100,000	40 ft. 0 in.	St. Und'frame	47,100	Friction	Arch Bar	Rodger
Louisville & Nashville	1,000	Gondola	100,000	41 ft. 6 in.	St. Und'frame	44,700	Friction	St. Side Fr.	Chickasaw Ship.
	1,000	Hopper	110,000	30 ft. 6 in.	All Steel	40,600	Friction	St. Side Fr.	Cambria
	500	Box	80,000	31 ft. 6 in.	St. Und'frame	43,600	Friction	St. Side Fr.	Mt. Vernon
	500	Box	80,000	31 ft. 6 in.	St. Und'frame	43,600	Friction	St. Side Fr.	Chickasaw Ship.
	2,000	Hopper	110,000	30 ft. 6 in.	All Steel	40,600	Friction	St. Side Fr.	Am. Car & Fdy.
Louis. Henderson & St. Louis	50	Hopper	110,000	30 ft. 6 in.	All Steel	41,139	Friction		Cambria Steel
	100	Hopper	110,000		All Steel				Am. Car & Fdy.
Maine Central	350	Box	80,000	40 ft. 6 in.	Steel Frame		Friction	St. Side Fr.	Keith
	100	Stock	80,000	40 ft. 6 in.	Steel Frame		Friction	St. Side Fr.	Keith
	10	Dairy	70,000	40 ft. 0 in.	Steel Frame		Friction	St. Side Fr.	Keith
	50	Gen. Serv.	100,000	40 ft. 0 in.	Steel		Friction	St. Side Fr.	Standard
Mathieson Alkali Works	20	Tank	30,000						Gen. Am. Tk. Car
Merrimac Chemical Co.	1	Tank	43,000	37 ft. 4 in.	St. Und'frame	47,800	Spring	Arch Bar	Gen. Am. Tk. Car
Michigan Central	2,000	Automobile	100,000	41 ft. 6 in.	All Steel	47,600	Friction	St. Side Fr.	Standard Steel
	500	Refrigerator	70,000	33 ft. 0 in.	St. Und'frame	55,700	Friction	St. Side Fr.	Merchants Disp.
	500	Gondola	100,000	41 ft. 6 in.	All Steel	42,800	Friction	St. Side Fr.	General American
	549	Gondola	100,000	41 ft. 6 in.	All Steel	43,100	Friction	St. Side Fr.	Buffalo St. Car
	783	Gondola	100,000	41 ft. 5 in.	All Steel	43,100	Friction	St. Side Fr.	Standard Steel
	21	Caboose	60,000	31 ft. 11 in.	St. Und'frame	35,000	Spring	St. Side Fr.	Company Shops
Minn., St. P. & S. Ste. Marie	500	Box	80,000	40 ft. 0 in.	Steel Frame	41,400	Friction	St. Side Fr.	Pullman
	500	Box	80,000	40 ft. 0 in.	Steel Frame	41,400	Friction	St. Side Fr.	Am. Car & Fdy.
	250	Gondola	100,000	41 ft. 5 in.	Steel Frame	43,100	Friction	St. Side Fr.	Pullman
Missouri, Kansas & Texas	1,000	Box	80,000	40 ft. 6 in.	St. Und'frame		Friction	St. Side Fr.	Am. Car & Fdy.
	500	Automobile	80,000	40 ft. 6 in.	St. Und'frame		Friction	St. Side Fr.	Mt. Vernon
	300	Flat	100,000	41 ft. 0 in.	St. Und'frame		Friction	St. Side Fr.	General American
	200	Refrigerator	60,000	40 ft. 0 in.	St. Und'frame		Friction	St. Side Fr.	General American
	500	Box	80,000	40 ft. 6 in.	St. Und'frame		Friction	St. Side Fr.	Am. Car & Fdy.
Missouri Portland Cement Co.	10	Hopper	100,000						Am. Car & Fdy.

Purchaser	No.	Class	Capacity	Length	Construction	Weight	Draft gear	Trucks	Builder
Morrell, John, Co.....	100	Refrigerator	80,000	36 ft. 0 in.	Steel Frame	39,500	Friction	St. Side Fr.	Am. Car & Fdy.
Nash., Chat. & St. Louis.....	500	Box	80,000	36 ft. 0 in.	St. Und'frame	39,500	Friction	St. Side Fr.	Am. Car & Fdy.
	250	Vent. Box	80,000	38 ft. 0 in.	Steel Frame	39,000	Friction	St. Side Fr.	Am. Car & Fdy.
	150	Stock	100,000	40 ft. 0 in.	St. Und'frame	31,600	Friction	St. Side Fr.	Am. Car & Fdy.
	100	Flat	8,050g.						Am. Car & Fdy.
	199	Gondola	100,000	36 ft. 9 1/2 in.	All Steel	42,800	Friction	Arch Bar	Standard Tank
National Ref. Co.....	8	Tank	100,000	30 ft. 6 in.	All Steel	40,400	Friction	St. Side Fr.	Am. Car & Fdy.
New Jersey Zinc Co.....	5	Gondola	110,000	40 ft. 6 3/4 in.	All Steel	45,800	Friction	St. Side Fr.	Am. Car & Fdy.
New Orleans Ref. Co.....	50	Tank	110,000	40 ft. 6 3/4 in.	All Steel	45,800	Friction	St. Side Fr.	Standard Steel
New Sabinas Co.....	10	Hopper	100,000	41 ft. 6 in.	Steel	43,100	Friction	St. Side Fr.	Pressed Steel
New York Central.....	1,000	Hopper	70,000	33 ft. 0 in.	St. Und'frame	55,800	Friction	St. Side Fr.	Merchants Disp.
	1,000	Box	110,000	30 ft. 6 in.	All Steel	40,600	Friction	St. Side Fr.	Am. Car & Fdy.
	1,000	Box	110,000	40 ft. 10 1/2 in.	All Steel	42,300	Friction	St. Side Fr.	Am. Car & Fdy.
	1,000	Refrigerator	80,000	39 ft. 11 3/4 in.	St. Und'frame	39,200	Friction	St. Side Fr.	Am. Car & Fdy.
	978	Hop. Bod.	80,000	40 ft. 2 3/4 in.	All Steel	41,400	Friction	St. Side Fr.	Ryan Car
	49	Hopper	80,000	40 ft. 2 3/4 in.	All Steel	41,400	Friction	St. Side Fr.	Buffalo St. Car
	500	Flat Bod.	80,000	33 ft. 0 in.	St. Und'frame				Standard Steel
	300	Stock Bod.	80,000	33 ft. 0 in.	St. Und'frame				Am. Car & Fdy.
	173	Stock Bod.	80,000	33 ft. 0 in.	St. Und'frame				Company Shops
	500	Gon. Bod.	80,000	33 ft. 0 in.	St. Und'frame				Illinois Car.
	500	Gon. Bod.	80,000	33 ft. 0 in.	St. Und'frame				Merchants Disp.
	1,700	Box Bod.	80,000	33 ft. 0 in.	St. Und'frame				Illinois Car.
	500	Box	80,000	33 ft. 0 in.	St. Und'frame				Keith
	6	Caboose	80,000	33 ft. 0 in.	St. Und'frame				Am. Car & Fdy.
New York, Chicago & St. L..	300	Stock	80,000	33 ft. 0 in.	St. Und'frame	41,000	Spring	St. Side Fr.	Pressed Steel
	400	Refrigerator	70,000	40 ft. 5 3/4 in.	St. Und'frame	56,000	Friction	St. Side Fr.	Standard Steel
	1,000	Automobile	80,000	40 ft. 6 in.	St. Und'frame	42,000	Friction	St. Side Fr.	Ralston
N. Y. New Haven & Hartford	6	Caboose	24 ft. 0 in.		All Steel	38,500	Friction	Arch Bar	Company Shops
Norfolk & Western.....	1,500	Hopper	140,000	36 ft. 10 1/2 in.	All Steel	52,400	Friction	St. Side Fr.	General American
	3,000	Hopper	140,000	36 ft. 10 1/2 in.	All Steel	52,400	Friction	St. Side Fr.	General American
	1,500	Hopper	140,000	36 ft. 10 1/2 in.	All Steel	52,400	Friction	St. Side Fr.	Am. Car & Fdy.
	1,000	Box	100,000	40 ft. 6 in.	St. Und'frame	46,800	Friction	St. Side Fr.	Standard Steel
	29	Caboose	100,000	50 ft. 3 in.	St. Und'frame	54,000	Friction	St. Side Fr.	General American
Northern Pacific	1,000	Automobile	80,000	40 ft. 6 in.	St. Und'frame	39,000	Friction	St. Side Fr.	General American
	250	Stock	70,000	41 ft. 1 3/4 in.	St. Und'frame	57,800	Friction	St. Side Fr.	Am. Car & Fdy.
	1,000	Refrigerator	100,000	40 ft. 0 in.	St. Und'frame	50,000	Friction	St. Side Fr.	Rodger Ballast Car
	250	Hart Conv.	100,000	40 ft. 0 in.	Steel	43,000	Friction	St. Side Fr.	Standard Steel
	1,000	Box	80,000	40 ft. 9 in.	St. Und'frame	44,500	Friction	St. Side Fr.	Am. Car & Fdy.
	1,000	Box	80,000	40 ft. 9 in.	St. Und'frame	44,500	Friction	St. Side Fr.	General American
	1,000	Box	80,000	40 ft. 9 in.	St. Und'frame	44,500	Friction	St. Side Fr.	Pressed Steel
Northern Refr. Car Co.....	500	Refrigerator	60,000	39 ft. 1 1/2 in.	St. Und'frame	54,900	Friction	St. Side Fr.	Pullman
	500	Refrigerator	60,000	33 ft. 2 3/4 in.	St. Und'frame	54,300	Friction	St. Side Fr.	Pullman
Old Time Molasses Co., Inc..	72	Tank	10,000g.						Am. Car & Fdy.
Omaha Ref. Co.....	10	Tank	8,050g.						Penn. Tank
Oregon Short Line	10	Caboose	29 ft. 7 in.		St. Und'frame	36,370	Friction	St. Side Fr.	Mt. Vernon
Ore.-Wash. R. R. & Nav. Co..	5	Caboose	29 ft. 7 in.		St. Und'frame	36,370	Friction	St. Side Fr.	Mt. Vernon
Pacific Electric	200	Dump	60,000	39 ft. 10 3/4 in.	St. Und'frame	52,500	Friction	St. Side Fr.	Am. Car & Fdy.
Pac. Fruit Express.....	700	Refrigerator	60,000	33 ft. 2 3/4 in.	St. Und'frame	52,500	Friction	St. Side Fr.	General American
	2,600	Refrigerator							Standard Steel
	1,000	Refrigerator							Pullman
	1,000	Refrigerator							General American
	1,030	Refrigerator							Pac. Car & Fdy.
	1,500	Refrigerator							Standard Steel
	500	Refrigerator							Mt. Vernon
Pease, F. M.....	100	Tank	8,050g.						Penn. Tank
Penn. Coal & Coke Co.....	1,000	Hopper	110,000		Steel				Am. Car & Fdy.
Pennsylvania	100	Cabin	24 ft. 0 in.		All Steel	28,000	Friction	St. Side Fr.	Company Shops
Penn. Salt Mfg. Co.....	3	Flat	60,000						General American
	10	Tank	30,000						Gen. Am. Tk. Car
	5	Tank							Gen. Am. Tk. Car
Penn. Tank Line.....	3	Tank	8,000g.						Penn. Tank
	7	Tank	10,000g.						Penn. Tank
	22	Tank	10,000g.						Penn. Tank
Pere Marquette	500	Automobile	80,000	40 ft. 6 in.	St. Und'frame	45,000	Friction	St. Side Fr.	Western St. C. & F.
	500	Automobile	80,000	40 ft. 6 in.	St. Und'frame	45,000	Friction	St. Side Fr.	Western St. C. & F.
	1,500	Automobile	80,000	40 ft. 6 in.	St. Und'frame	45,000	Friction	St. Side Fr.	Pressed Steel
Philadelphia & Reading.....	500	Hopper	110,000	30 ft. 6 in.	All Steel	41,000	Friction	St. Side Fr.	Ralston
	500	Hopper	140,000	39 ft. 0 in.	All Steel	53,073	Friction	St. Side Fr.	Pressed Steel
	500	Hopper	140,000	39 ft. 0 in.	All Steel	53,641	Friction	St. Side Fr.	Standard Steel
	500	Hopper	140,000	39 ft. 0 in.	All Steel	53,466	Friction	St. Side Fr.	Midvale Steel
	500	Hopper	140,000	39 ft. 0 in.	All Steel	53,537	Friction	St. Side Fr.	Am. Car & Fdy.
	500	Gondola	140,000	46 ft. 0 in.	All Steel	50,600	Friction	St. Side Fr.	Pressed Steel
	500	Gondola	140,000	46 ft. 0 in.	All Steel	50,600	Friction	St. Side Fr.	Standard Steel
	100	Refrigerator	80,000	39 ft. 11 1/2 in.	St. Und'frame	59,000	Friction	St. Side Fr.	Am. Car & Fdy.
Phillips Petroleum Co.....	290	Tank	8,050g.						Standard Tank
Pickands, Mather & Co.....	34	Air Dump			All Steel				Kilbourne & Jacobs
Pittsburgh & Lake Erie.....	1,500	Hopper	140,000	39 ft. 0 in.	All Steel	50,100	Friction	St. Side Fr.	Standard Steel
	2,018	Gondola	140,000	45 ft. 11 in.	All Steel	50,900	Friction	St. Side Fr.	Standard Steel
	1,500	Hopper	140,000	39 ft. 0 in.	All Steel	50,100	Friction	St. Side Fr.	Pressed Steel
	300	Box	80,000		St. Und'frame				Am. Car & Fdy.
Pittsburgh & West Virginia..	1,000	Hopper	110,000	30 ft. 6 in.	All Steel	41,500	Friction	St. Side Fr.	Cambria
	6	Caboose	23 ft. 3 3/4 in.		St. Und'frame	41,000	Friction	St. Side Fr.	Am. Car & Fdy.
Richfield Oil Co.....	21	Tank	10,050g.						Standard Tank
Rich., Fred. & Potomac.....	30	Hop. Bod.	100,000	30 ft. 6 in.	All Steel	39,000	Friction	Arch Bar	Richmond Car
Roebing's Sons, John A.....	2	Hopper	110,000						Pressed Steel
Roxana Petroleum Co.....	50	Tank	8,050g.						Standard Tank
	25	Tank	8,050g.						Gen. Am. Tk. Car
St. Louis Refrig. Car Co.....	7	Refrigerator	80,000	39 ft. 9 in.	St. Und'frame	55,400	Friction	Arch Bar	Company Shops
St. Louis-San Francisco.....	1,200	Box	80,000	40 ft. 0 in.	Steel Frame	44,900		St. Side Fr.	Am. Car & Fdy.
	1,000	Hopper	110,000	36 ft. 0 in.	Steel Frame	43,230		St. Side Fr.	Chickasaw Ship.
	500	Hopper	110,000	36 ft. 0 in.	Steel Frame	43,230		St. Side Fr.	Pullman
	300	Stock	80,000	40 ft. 0 in.	Steel Frame	38,300		St. Side Fr.	Mt. Vernon
	1,000	Hop. Bod.	100,000		Steel			St. Side Fr.	Am. Car & Fdy.
St. Louis Southwestern.....	500	Box	80,000	40 ft. 6 in.	St. Und'frame	45,400	Friction	St. Side Fr.	Am. Car & Fdy.
	500	Automobile	80,000	40 ft. 6 in.	St. Und'frame	47,500	Friction	St. Side Fr.	Mt. Vernon
	200	Hart. Conv.	100,000	30 ft. 0 in.	St. Und'frame	49,500	Friction	St. Side Fr.	Rodger
	552				Wood				Company Shops
San Diego & Arizona.....	20	Dump	100,000	40 ft. 0 in.	St. Cent. Sills	46,500	Friction	St. Side Fr.	Am. Car & Fdy.
Schenectady Varnish Co.....	1	Tank	8,050g.						Standard Tank
Seaboard Air Line.....	900	Box	80,000	35 ft. 9 1/2 in.	Steel Frame	44,400		Arch Bar	Pressed Steel
	1,250	Box	80,000	35 ft. 9 1/2 in.	Steel Frame	43,700		St. Side Fr.	Chickasaw Ship.
	300	Flat	80,000	41 ft. 0 in.	Steel Frame	33,600		St. Side Fr.	Chickasaw Ship.
	200	Phosphate	100,000	34 ft. 1/2 in.	All Steel	42,200		St. Side Fr.	Chickasaw Ship.
	100	Phosphate	100,000	34 ft. 1/2 in.	All Steel	39,500		St. Side Fr.	Magor
Shell Co. of Cal.....	61	Tank	10,000g.	32 ft. 11 in.	All Steel	44,000	Friction	St. Side Fr.	Standard Tank
Sinclair Ref. Co.....	5	Tank	6,000g.						Am. Car & Fdy.
	5	Tank	8,000g.						Am. Car & Fdy.
Skelly Oil Co.....	35	Tank	8,000g.		All Steel	49,500	Friction	Arch Bar	Standard Tank
	35	Tank	8,000g.		All Steel	48,000	Friction	Arch Bar	Gen. Am. Tk. Car
Southern Pacific	2,000	Automobile	100,000						General American
	40	Auto. Air Dump							Kilbourne & Jacobs
	220	Gen. Serv.	100,000	40 ft. 0 in.					Am. Car & Fdy.
	200	Box							Company Shops
	3,700	Box							Standard Steel
	350	Flat							Ralston
	550	Stock							Pullman
	300	Flat							Company Shops
	100	Caboose							Company Shops

Purchaser	No.	Class	Capacity	Length	Construction	Weight	Draft gear	Trucks	Builder
Southern Railway	3,000	Box	80,000	36 ft. 0 in.	St. Cent. Sills	42,500	Friction	St. Side Fr.	Am. Car & Fdy.
.....	1,390	Box	80,000	36 ft. 0 in.	St. Cent. Sills	42,500	Friction	St. Side Fr.	Mt. Vernon
.....	1,000	Box	80,000	36 ft. 0 in.	St. Cent. Sills	42,500	Friction	St. Side Fr.	Standard Steel
.....	500	Automobile	80,000	40 ft. 0 in.	St. Cent. Sills	46,500	Friction	St. Side Fr.	Standard Steel
Tennessee Central	250	Caboose	36 ft. 0 in.	St. Cent. Sills	40,700	Spring	Arch Bar	Lenoir	
.....	300	Gondola	100,000	41 ft. 1½ in.	St. Und'frame	45,000	Friction	Arch Bar	Western St. C. & F.
Tenn. Coal, Iron & R. R.	15	Box	100,000	38 ft. 7 in.	Steel Frame	46,000	Friction	.....	Chickasaw Ship.
.....	75	Gondola	100,000	38 ft. 2 in.	Steel Frame	47,850	Friction	.....	Chickasaw Ship.
.....	75	Gondola	140,000	38 ft. 7 in.	All Steel	54,800	Friction	.....	Chickasaw Ship.
Texas & Pacific	150	Tank	100,000	32 ft. 4 in.	All Steel	45,000	Friction	St. Side Fr.	Am. Car & Fdy.
.....	533	Freight	.....	.....	.....	.....	.....	.....	Company Shops
Texas Company	100	Tank	80,000	.....	All Steel	38,000	Spring	Arch Bar	Gen. Am. Tk. Car
.....	5	Tank	5,000g.	.....	.....	.....	.....	.....	Penn. Tank
Toledo & Western	1	.....	.....	.....	St. Und'frame	.....	.....	.....	Company Shops
.....	2	.....	.....	.....	Wood	.....	.....	.....	Company Shops
San Antonio & Aransas Pass..	2	.....	.....	.....	All Steel	.....	.....	.....	Company Shops
Transcontinental Oil Co.	75	Tank	8,000g.	.....	.....	.....	.....	.....	Am. Car & Fdy.
.....	75	Tank	10,000g.	.....	.....	.....	.....	.....	Am. Car & Fdy.
Union Pacific	1,000	Box	100,000	40 ft. 7½ in.	St. Und'frame	45,800	Friction	St. Side Fr.	Am. Car & Fdy.
.....	1,000	Box	100,000	40 ft. 7½ in.	St. Und'frame	45,800	Friction	St. Side Fr.	Mt. Vernon
.....	1,000	Automobile	100,000	40 ft. 7½ in.	St. Und'frame	47,600	Friction	St. Side Fr.	General American
.....	500	Automobile	100,000	40 ft. 7½ in.	St. Und'frame	47,600	Friction	St. Side Fr.	Standard Steel
.....	1,000	Automobile	100,000	50 ft. 3½ in.	All Steel	55,300	Friction	St. Side Fr.	Pullman
.....	30	Caboose	29 ft. 7 in.	St. Und'frame	36,370	Friction	St. Side Fr.	Mt. Vernon	
.....	100	Tank	12,500g.	37 ft. 6¾ in.	All Steel	.....	Friction	Arch Bar	Am. Car & Fdy.
Union Refr. Transit.	500	Refrigerator	80,000	.....	St. Und'frame	.....	.....	.....	Am. Car & Fdy.
.....	350	Refrigerator	80,000	40 ft. 0 in.	St. Und'frame	.....	.....	.....	Am. Car & Fdy.
.....	350	Refrigerator	80,000	.....	St. Und'frame	.....	.....	.....	Am. Car & Fdy.
Union Tank Car Co.	500	Tank	100,000	.....	All Steel	50,229	Friction	.....	Cambria Steel
.....	1,000	Tank	.....	.....	.....	.....	.....	.....	Standard Steel
.....	1,000	Tank	.....	.....	.....	.....	.....	.....	Am. Car & Fdy.
.....	500	Tank	.....	.....	.....	.....	.....	.....	Gen. Am. Tk. Car
United Gas Impr. Co.	150	Coal	100,000	.....	.....	.....	.....	.....	Am. Car & Fdy.
United Oil & N. Gas Prod. Co.	3	Tank	8,000g.	.....	.....	.....	.....	.....	Penn. Tank
United Verde Copper Co.	24	Ore	80,000	.....	All Steel	.....	Friction	.....	Pressed Steel
Vance Lumber Co.	5	Flat	140,000	41 ft. 0 in.	Wood	.....	.....	.....	Pac. Car & Fdy.
Vicks., Shreveport & Pacific..	100	Box	60,000	36 ft. 0 in.	Wood	34,500	Friction	Arch Bar	Am. Car & Fdy.
.....	50	Box	60,000	37 ft. 11 in.	Wood	34,800	Friction	Arch Bar	Am. Car & Fdy.
.....	15	Box	60,000	37 ft. 11 in.	Wood	34,800	Friction	Arch Bar	Company Shops
.....	15	Box	60,000	37 ft. 11 in.	Wood	34,800	Friction	Arch Bar	Company Shops
.....	15	Flat	80,000	40 ft. 0 in.	Wood	29,700	Friction	Arch Bar	Company Shops
Wabash	750	Automobile	80,000	40 ft. 6 in.	St. Und'frame	47,000	Friction	St. Side Fr.	Pullman
.....	755	Automobile	80,000	40 ft. 6 in.	St. Und'frame	47,000	Friction	St. Side Fr.	Am. Car & Fdy.
.....	750	Hopper	100,000	30 ft. 6 in.	All Steel	40,000	Friction	Arch Bar	Standard Steel
.....	2,050	Gondola	100,000	41 ft. 6 in.	St. Und'frame	42,000	Friction	Arch Bar	General American
Western Pacific	100	Automobile	100,000	40 ft. 6 in.	St. Und'frame	40,000	Friction	St. Side Fr.	Mt. Vernon
.....	2,000	Refrigerator	60,000	33 ft. 2½ in.	St. Und'frame	49,000	Friction	St. Side Fr.	Am. Car & Fdy.
Westmoreland Coal Co.	100	Hopper	110,000	30 ft. 6 in.	All Steel	41,529	Friction	.....	Cambria Steel
West Penn Power Co.	60	Hopper	110,000	30 ft. 5½ in.	All Steel	34,000	Friction	St. Side Fr.	Am. Car & Fdy.
.....	11	Dump	100,000	32 ft. 2 in.	All Steel	57,700	Friction	Arch Bar	Clark Car Co.
W. Va. Pulp & Paper Co.	10	Box	80,000	40 ft. 6 in.	St. Und'frame	44,600	Friction	.....	Pressed Steel
Wharton & Northern.	10	Side Dump	.....	.....	.....	.....	.....	.....	Clark Car
Wilcox Co.	50	Hopper	110,000	30 ft. 6 in.	All Steel	41,600	Friction	.....	Pressed Steel
Wynooche Timber Co.	2	Ballast	.....	.....	Composite	.....	.....	.....	Pac. Car & Fdy.
Various other companies.	905	Log & Misc.	.....	.....	.....	.....	.....	.....	Pac. Car & Fdy.

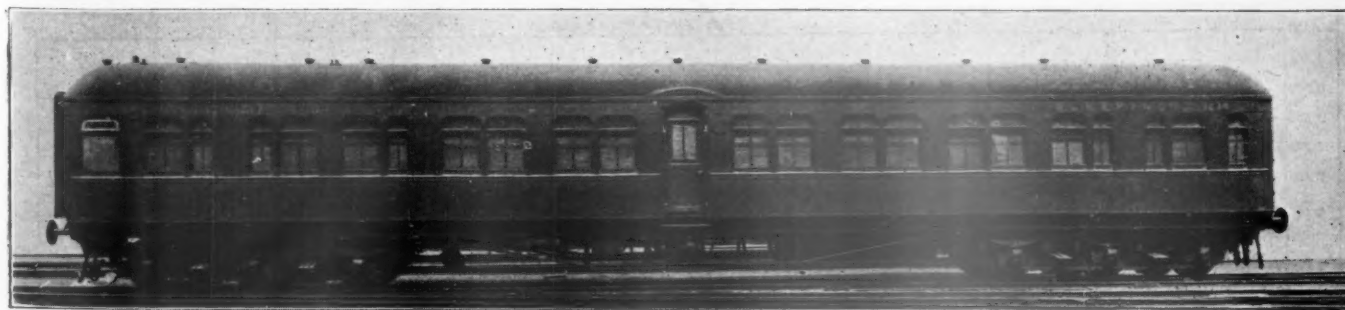
*Not included in totals.

Canada

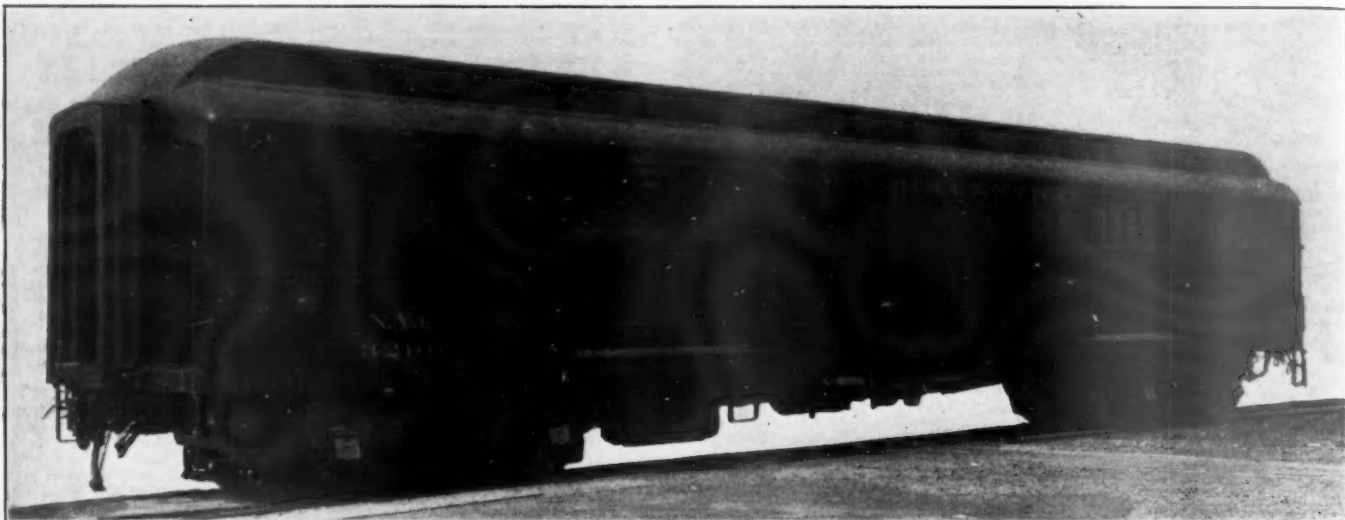
Canadian Pacific	415	Automobile	84,000	40 ft. 6 in.	Steel Frame	47,400	Friction	St. Side Fr.	Company Shops
.....	250	Refrigerator	80,000	34 ft. 5 in.	St. Und'frame	.....	Friction	Arch Bar	National Steel
Grand Trunk—Eastern Lines..	30	Caboose	60,000	29 ft. 0½ in.	St. Und'frame	40,000	Friction	Arch Bar	Company Shops
Grand Trunk—Western Lines.	25	Flat	60,000	39 ft. 8 in.	Steel Frame	38,600	Spring	Arch Bar	Company Shops
.....	12	Caboose	.....	34 ft. 10 in.	Steel Frame	36,000	Friction	Arch Bar	Company Shops
Esquimalt & Nanaimo.	1	.....	.....	.....	Wood	.....	.....	.....	Company Shops
Quebec Central	10	.....	.....	.....	All Steel	.....	.....	.....	Company Shops
.....	3	.....	.....	.....	Wood	.....	.....	.....	Company Shops

Export

Argentine State Rys.	100	Ballast	.....	.....	.....	.....	.....	.....	Standard Steel
Bethlehem Chile I. M. Corp. .	20	Hopper	100,000	17 ft. 5 in.	Steel	.....	.....	.....	Magor
Central San Antonio (Cuba) ..	10	Cane	.....	.....	.....	.....	.....	.....	Magor
Chile Exploration	50	Ore	140,000	29 ft. 0 in.	All Steel	53,000	Friction	.....	Pressed Steel
Cuban-American Sugar Co.	50	Cane	30,000	.....	.....	.....	.....	.....	Magor
Czarnikow-Rionda Co.	40	Cane	60,000	.....	.....	.....	.....	.....	Magor
Kennedy, Leonard, & Co. (for Brazil)	40	Air Dump	.....	.....	.....	.....	.....	.....	Magor
Manati Sugar Co.	50	Cane	60,000	.....	.....	.....	.....	.....	Magor
Manila R. R.	50	Cane	60,000	.....	.....	.....	.....	.....	Koppel
Mexican Ry.	15	Caboose	.....	14 ft. 8 in.	St. Und'frame	20,000	Spring	Arch Bar	.....
.....	6	Tank	80,000	.....	All Steel	45,100	Friction	St. Side Fr.	.....
.....	10	Flat	80,000	40 ft. 1 in.	All Steel	34,100	Friction	Arch Bar	.....
.....	1	Box	60,000	34 ft. 2 in.	Wood	31,000	Spring	Arch Bar	.....
National Rys. of Mexico.	250	Tank	.....	.....	.....	.....	.....	.....	Gen. Am. Tk. Car
Northwestern Ry. of Brazil. .	70	.....	.....	.....	.....	.....	.....	.....	Standard Steel
United Fruit Co.	50	Fruit	40,000	.....	.....	.....	.....	.....	Magor
.....	25	Ballast	60,000	.....	.....	.....	.....	.....	Magor
.....	50	Flat	40,000	.....	.....	.....	.....	.....	Magor
.....	25	Cane	.....	.....	.....	.....	.....	.....	Magor
Warner Sugar Ref. Co.	10	Logging	60,000	36 ft. 0 in.	Steel	.....	.....	.....	Magor
.....	150	Cane	60,000	.....	.....	.....	.....	.....	Magor



A Sleeping Car on the New South Wales Government Railways



Passenger Car Orders Equal Four-Year Total

Match Combined Figures for 1918, 1919, 1920 and 1921—
Production, However, Is Small

ORDERS FOR passenger cars for service on the railways of the United States totaled 2,382, making 1922 the best year since 1916. In that year the orders totaled 2,544, inclusive, however, of orders placed by Canadian railroads. The 1922 total compared with 246 in 1921, with 1,781 in 1920, with 292 in 1919 and 109 in 1918, but it was not up to the average of the years prior to 1916.

Passenger car production totaled only 676 for domestic service, this being the smallest figure ever reported by the *Railway Age* covering domestic passenger car production

TABLE I. THE PASSENGER CAR ORDERS OF 1921.

For service in the United States.....	2,382
For service in Canada.....	87
For export to other countries.....	19
Grand Total	2,488

except for 1919, in which year the production was only 391. The reason for the small 1922 production was the practical lack of orders on hand at the beginning of the year and the relatively slow manner in which the car builders were able to get into production on their 1922 business. The 1923 production should very much exceed that of 1922, for as in the case of locomotives and freight cars, there is a large volume of business now on the builders' books and there are also favorable prospects for a continuation of the 1922 level of business in new orders.

The passenger car orders in 1922 were spread fairly evenly throughout the year. It is interesting to observe that the year's total of orders was nearly equivalent to the total

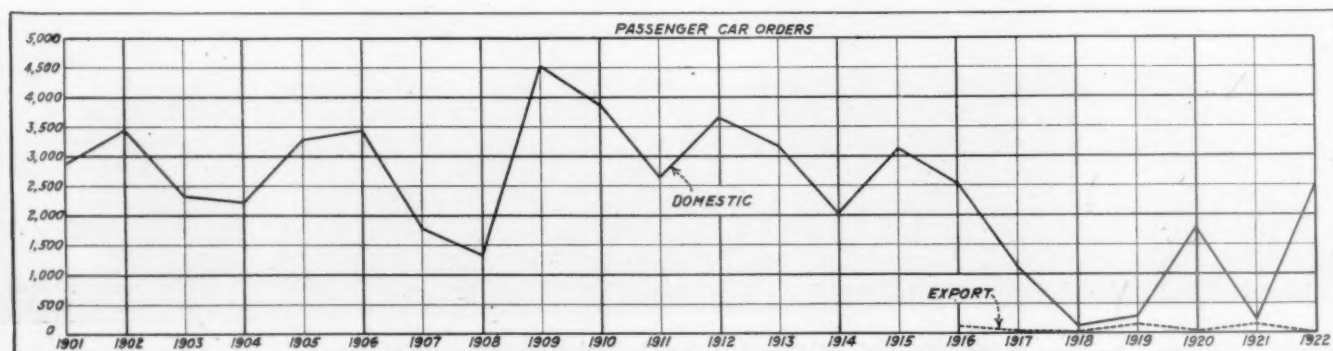
TABLE II. ORDERS FOR PASSENGER CARS SINCE 1901
Domestic orders only

	Passenger cars		Passenger cars
1901	2,879	1909	4,514
1902	3,459	1910	3,881
1903	2,310	1911	2,623
1904	2,213	1912	3,642
1905	3,289	1913	3,179
1906	3,402	1914	2,002
1907	1,791	1915	3,101
1908	1,319		

Domestic and Foreign

Year	Domestic	Canadian	Export	Total
1916	2,544	.....	109	2,653
1917	1,124	.....	43	1,167
1918	109	22	26	157
1919	292	347	143	782
1920	1,781	275	38	2,094
1921	246	91	155	492

orders placed in the preceding four years of 1918, 1919, 1920 and 1921, in only one year, of which, 1920, did the orders top 300. The 1920 orders, as already noted, totaled 1,781. This must mean that the volume of 1922 business represented on the part of the railways the first really successful attempt that the latter have been able to make in



several years in the way of meeting deferred passenger car requirements. For several years the railways have been able to make but a small amount of progress towards securing an adequate number of passenger train cars or towards

TABLE III. PASSENGER CARS BUILT IN 1921

	United States	Canada	Total
Domestic	676	71	747
Foreign	144	...	144
	820	71	891

Comparison with Previous Years

Year	Passenger		Total
	Domestic	Foreign	
1899	1,201	104	1,305
1900	1,515	121	1,636
1901	1,949	106	2,055
1902	From 1902 to 1907 passenger car figures in these two columns included in corresponding frt. car columns.		1,948
1903			2,007
1904			2,144
1905*			2,551
1906*			3,167
1907*			5,457
1908*	1,645	71	1,716
1909*	2,698	151	2,849
1910*	4,136	276	4,412
1911*	3,938	308	4,246
1912†	2,822	238	3,060

United States			Canadian			Grand Total
Domestic	Foreign	Total	Domestic	Foreign	Total	
1913	2,559	220	2,779	517	...	3,296
1914	3,310	56	3,366	325	...	3,691
1915	1,852	14	1,866	83	...	1,949
1916	1,732	70	1,802	37	...	1,839
1917	1,924	31	1,955	45	...	2,000
1918	1,480	92	1,572	1	...	1,503
1919	306	85	391	160	...	551
1920	1,272	168	1,440	...	...	...
1921	1,275	39	1,314	361	...	1,675

* Includes Canadian output.

† Includes Canadian output and equipment built in company shops.

the desired end of replacing wooden with steel equipment. During the war the steps in this direction had of necessity to be few and small. The Railroad Administration included no passenger cars in its purchases of standard equipment during 1918 and in 1920 when the Interstate Commerce Commission was making loans from the \$300,000,000 revolving fund, no loans were made except such as were deemed necessary to facilitate the handling of freight. The 1,781 cars ordered in 1920 were in spite of this condition.

The result was shown in the small volume of new passenger car orders already referred to. It is also shown in the number of passenger cars in service. It is true that at the end of 1916 the Class I railroads owned 52,179 passenger train cars, whereas at the end of 1920 this total had been increased to 53,501 and at the end of 1921, to

54,331. The 1921 figures are not shown by types of cars, but it develops that the increase from 1916 to 1920 was primarily in baggage cars. Whereas at the end of 1916 the total of baggage cars was 10,007, at the end of 1920 it was 11,927. The number of coaches at the end of 1916 was 28,009; at the end of 1920 it was 27,953. Thus, as between 1916 and 1920 there was an increase of only 1,322 passenger cars of all types. There was an increase of 1,920 in the number of baggage cars; in other words, more than the total amount of the increase in all cars was taken up by the increased number of cars which carried no passengers. The result was decreases in the other types of cars. The decrease in the number of coaches was 156; in combination passenger and smoking cars, 106; in dining cars, 28; etc. This was the condition with which the railways had to meet the unusual expansion of passenger traffic in 1918 and 1920.

The figures as to cars installed or retired are also of interest. In some of the years prior to 1916 the Class I railroads installed as many as 2,500 or 3,000 new cars, and their retirements ran as high as from 1,300 to 2,100. In 1917, which was a good year, they installed 2,535 new cars and retired 1,671 old cars. Suddenly in 1919 the figures were sharply reduced. In that year the new cars installed totaled 435, the retirements only 670. In 1920 the respective figures were 621 and 885. In 1921 the new cars installed totaled 1,629 and retirements, 881, the increase in the figures in that year reflecting the increased orders placed during 1920.

It is generally accepted that the railways need passenger cars, although it is also true that it has been felt that this is a requirement that could properly be allowed to follow the filling of some of the more important demands for freight handling facilities of one kind and another. It is also accepted that one of the most important needs in connection with passenger train cars is the necessity for replacing wooden with steel equipment. The large number of cars ordered in 1922 for suburban service by such roads as the Reading, Rock Island, North Western, etc., apparently gives good promise that the railways are again in a position where they can take some steps towards meeting their passenger car needs.

An important feature of the 1922 passenger car orders was the large purchases of gasoline rail-motor cars which are now receiving increasing favor for light branch line service. In the following tabulations there are given a part of the orders of this type of equipment which were placed during the year. The list is apparently not complete. The gasoline motor car orders are not included in the totals of passenger train cars given in the tables.

Passenger Car Orders in 1922

For Service in the United States

Purchaser	No.	Class	Length	Construction	Seating capacity	Weight	Wheels per truck	Lighting	Builder
American Ry. Express	150	Exp. Refr.	50 ft. 0 in.	St. Und'frame	..	..	..	..	General American
Ann Arbor	2	Bagg. & Exp.	77 ft. 2 in.	Composite	..	130,000	6	Electric	Hotchkiss-Blue
Arms-Yager Ry Car Co.	14	Horse	60 ft. 11 in.	St. Und'frame	..	..	4	..	Pullman
Atchison, Topeka & Santa Fe ..	8	Dining	80 ft. 6 in.	All Steel	36	172,200	6	Electric	Pullman
	8	Buf. Lib.	78 ft. 2 in.	All Steel	28	146,000	6	Electric	Pullman
Atlanta & West Point	2	Baggage	..	All Steel	..	..	..	Electric	Bethlehem
Atlantic Coast Line	25	Express	73 ft. 7 in.	All Steel	..	..	6	Electric	Bethlehem
	25	Coach	82 ft. 2 in.	All Steel	88	..	6	Electric	Bethlehem
	1	Coach	..	..	..	..	..	..	Bethlehem
Baltimore & Ohio	40	Coach	70 ft. 0 in.	All Steel	80	136,800	6	Electric	Pullman
	5	Mail	60 ft. 9½ in.	All Steel	..	124,000	6	Electric	Pullman
	3	Bagg. & Mail	70 ft. 9 in.	All Steel	..	129,000	6	Electric	Pullman
	2	Dining	81 ft. 3¼ in.	All Steel	36	161,000	6	Electric	Pullman
	30	Baggage	70 ft. 1½ in.	All Steel	36	160,000	6	Electric	Pullman
	1	Business	70 ft. 9 in.	All Steel	..	119,930	6	Electric	Am. Car & Fdy.
Bangor & Aroostook	2	Buf. Par.	79 ft. 0 in.	St. Und'frame	21	135,000	6	Electric	Pullman
Boston & Maine	5	Bag. & Mail	61 ft. 3 in.	All Steel	..	108,000	4	Electric	Hotchkiss-Blue
	65	Coach	70 ft. 3½ in.	All Steel	88	118,000	4	Electric	Osgood-Bradley
	20	Coach	70 ft. 3½ in.	All Steel	92	118,000	4	Electric	Osgood-Bradley
	8	Bagg. & Mail	70 ft. 3½ in.	All Steel	48	119,000	4	Electric	Osgood-Bradley
	25	Milk	51 ft. 0 in.	St. Und'frame	..	81,000	4	Electric	Laconia Car Co.
Bureau of Mines, U. S. Govt. ..	2	Mine Rescue	..	All Steel	..	..	..	..	Am. Car & Fdy.
Cambria & Indiana	1	Bagg. & Mail	44 ft. 0 in.	Steel	46	26,000	4	Electric	Serv. Mot. Truck

Purchaser	No.	Class	Length	Construction	Seating capacity	Weight	Wheels per truck	Lighting	Builder
Central of New Jersey.....	30	Coach	72 ft. 5½ in.	All Steel	78	115,000	4	Electric	Standard Steel
	20	Coach	72 ft. 5½ in.	All Steel	78	115,000	4	Electric	Am. Car & Fdy.
	10	Pass. & Bagg.	72 ft. 5½ in.	All Steel	50	115,200	4	Electric	Am. Car & Fdy.
	10	Baggage	74 ft. 4¼ in.	All Steel	..	136,200	6	Electric	Bethlehem
	55	Coach	72 ft. 5½ in.	All Steel	78	115,000	4	Electric	Standard Steel
	45	Coach	72 ft. 5½ in.	All Steel	78	115,000	4	Electric	Am. Car & Fdy.
	10	Pass. & Bagg.	72 ft. 5½ in.	All Steel	50	115,200	4	Electric	Am. Car & Fdy.
	5	Baggage	74 ft. 4¼ in.	All Steel	..	136,200	6	Electric	Am. Car & Fdy.
Charleston & Western Carolina..	2	Coach	82 ft. 2 in.	All Steel	88	.....	6	Electric	Bethlehem
Chesapeake & Ohio	8	Pass. & Bagg.	75 ft. 0 in.	All Steel	42	.....	6	Electric	Pressed Steel
	25	Express	72 ft. 2½ in.	All Steel	..	.....	6	Electric	Pressed Steel
	30	Coach	77 ft. 2 in.	All Steel	85	.....	6	Electric	Pressed Steel
	5	Dining	81 ft. 2½ in.	All Steel	36	.....	6	Electric	Pullman
Chicago & Eastern Ill.	17	Bagg.	72 ft. 0 in.	All Steel	..	.....	6	Electric	Pullman
Chicago & North Western.....	40	Coach	62 ft. 9 in.	All Steel	66	114,100	4	Gas & Elec.	Am. Car & Fdy.
	10	Smoking	62 ft. 9 in.	All Steel	70	113,500	4	Gas & Elec.	Am. Car & Fdy.
	19	Baggage	63 ft. 8 in.	All Steel	..	117,400	6	Gas	Am. Car & Fdy.
	5	Bagg. & Mail	73 ft. 8 in.	All Steel	..	137,000	6	Gas	Am. Car & Fdy.
	3	Pass. & Bagg.	76 ft. 7 in.	All Steel	54	136,800	6	Gas	Am. Car & Fdy.
	3	Chair	78 ft. 7 in.	All Steel	65	142,400	6	Gas & Elec.	Am. Car & Fdy.
	20	Coach	54 ft. 0 in.	All Steel	66	114,100	4	Gas & Elec.	Am. Car & Fdy.
Chicago, Burl. & Quincy.....	3	Baggage	70 ft. 0 in.	All Steel	..	140,800	6	Electric	Standard Steel
	22	Mail	60 ft. 0 in.	All Steel	..	.....	6	Electric	Standard Steel
	10	Bagg. & Mail	70 ft. 0 in.	All Steel	..	145,400	6	Electric	Standard Steel
	10	Dining	79 ft. 6 in.	All Steel	36	173,100	6	Electric	Pullman
	5	Chair	70 ft. 0 in.	All Steel	64	149,800	6	Electric	Pullman
	42	Coach	70 ft. 0 in.	All Steel	84	151,100	6	Electric	Pullman
	2	Chair & Coach	70 ft. 0 in.	All Steel	72	149,800	6	Electric	Pullman
	1	Pass. & Bagg.	70 ft. 0 in.	All Steel	36	149,300	6	Electric	Pullman
Chicago, Ind. & Louisville.....	4	Coach	77 ft. 0 in.	All Steel	84	142,000	6	Electric	Pullman
Chicago, Rock Island & Pac....	50	Suburban	70 ft. 0 in.	All Steel	100	82,000	4	Electric	Standard Steel
Clev., Cin., Chic. & St. L.....	1	Dining	70 ft. 6 in.	All Steel	36	152,000	6	Electric	Company shops
Colorado & Southern	5	Baggage	70 ft. 0 in.	All Steel	..	140,800	6	Electric	Standard Steel
	5	Bagg. & Mail	70 ft. 0 in.	All Steel	..	145,400	6	Electric	Standard Steel
	1	Dining	79 ft. 6 in.	All Steel	36	173,100	6	Electric	Pullman
	6	Coach	70 ft. 0 in.	All Steel	84	151,100	6	Electric	Pullman
El Paso & South Western.....	2	Coach	60 ft. 0 in.	All Steel	64	.....	4	Electric	Pullman
	2	Bagg. & Exp.	66 ft. 0 in.	All Steel	..	.....	6	Electric	Pullman
Florida East Coast.....	10	Coach	70 ft. 0 in.	All Steel	..	133,700	6	Electric	Pullman
	1	Dining	73 ft. 6 in.	All Steel	36	.....	6	Electric	Pullman
Ft. Worth & Denver City.....	4	Baggage	70 ft. 0 in.	All Steel	..	140,800	6	Electric	Standard Steel
	4	Bagg. & Mail	70 ft. 0 in.	All Steel	..	145,400	6	Electric	Standard Steel
	1	Dining	79 ft. 6 in.	All Steel	36	173,100	6	Electric	Pullman
	6	Coach	70 ft. 0 in.	All Steel	84	151,100	6	Electric	Pullman
Hutton, E. F.	1	Private	.....	All Steel	..	.....	..	.....	Am. Car & Fdy.
Interstate	1	Business	.....	All Steel	..	.....	..	Electric	Bethlehem
Long Island	40	Motor Coach	63 ft. 4¼ in.	All Steel	78	117,200	4	Electric	Am. Car & Fdy.
	10	Steam Coach	63 ft. 4¼ in.	All Steel	76	80,600	4	Electric	Am. Car & Fdy.
	40	Motor Coach	.....	.....	..	.....	..	.....	Am. Car & Fdy.
	20	Electric Trailer	.....	.....	..	.....	..	.....	Am. Car & Fdy.
	20	Coach	.....	.....	..	.....	..	.....	Am. Car & Fdy.
	10	Coach	.....	.....	..	.....	..	.....	Am. Car & Fdy.
	2	Bagg. & Mail	.....	.....	..	.....	..	.....	Am. Car & Fdy.
Louisville & Nashville.....	4	M. Coach	77 ft. 2¾ in.	St. Frame	80	145,000	6	Electric	Am. Car & Fdy.
	6	Coach	77 ft. 2¾ in.	St. Frame	82	144,500	6	Electric	Am. Car & Fdy.
	5	Horse	77 ft. 2¾ in.	St. Frame	..	136,300	6	Electric	Am. Car & Fdy.
	5	C. Coach & Bagg.	74 ft. 4¼ in.	St. Frame	36	140,000	6	Electric	Am. Car & Fdy.
	5	Baggage	72 ft. 2¾ in.	St. Frame	..	132,000	6	Electric	Am. Car & Fdy.
	1	Body	.....	All Steel	..	.....	..	.....	Am. Car & Fdy.
Louis, Hend. & St. Louis.....	4	Coach	70 ft. 0 in.	Steel	..	.....	..	.....	Am. Car & Fdy.
Maine Central	7	Bagg. & Mail	64 ft. 2½ in.	Steel	..	113,000	4	Electric	Osgood-Bradley
Michigan Central	1	Dining	80 ft. 5 in.	All Steel	36	211,400	6	Electric	Company shops
	8	Bagg. & Mail	63 ft. 4 in.	All Steel	..	116,500	4	Electric	Company shops
	2	Mail	63 ft. 4 in.	All Steel	..	135,000	4	Electric	Company shops
Minn., St. P. & Sault Ste. Marie	4	Bagg. & Mail	70 ft. 0 in.	All Steel	..	130,000	6	Electric	Am. Car & Fdy.
	4	Baggage	70 ft. 0 in.	All Steel	..	129,000	6	Electric	Am. Car & Fdy.
Mo., Kansas & Texas.....	30	Coach	80 ft. 3¾ in.	All Steel	92	.....	6	Electric	Am. Car & Fdy.
Nash., Chatt. & St. L.....	5	Baggage	72 ft. 2 in.	All Steel	..	129,500	6	Electric	Am. Car & Fdy.
	4	Bagg. & Mail	72 ft. 2 in.	All Steel	..	136,000	6	Electric	Am. Car & Fdy.
	2	Comp. Coach	77 ft. 8 in.	All Steel	86	140,500	6	Electric	Am. Car & Fdy.
	4	Coach	77 ft. 8 in.	All Steel	86	140,500	6	Electric	Am. Car & Fdy.
	1	Body	.....	.....	..	.....	..	.....	Am. Car & Fdy.
New York Central	20	Pass. & Bagg.	74 ft. 11½ in.	All Steel	48	137,800	6	Electric	Pressed Steel
	10	Coach	70 ft. 0 in.	All Steel	86	145,100	6	Electric	Pressed Steel
	35	Coach	73 ft. 0 in.	All Steel	85	.....	4	Electric	Pullman
	36	M. & Coach	.....	All Steel	..	.....	4	Electric	Standard Steel
	40	Baggage	60 ft. 6 in.	All Steel	..	.....	..	.....	Am. Car & Fdy.
	20	Coach	.....	All Steel	..	.....	..	.....	Am. Car & Fdy.
	20	Coach	.....	All Steel	..	.....	..	.....	Standard Steel
	10	Baggage	.....	All Steel	..	.....	..	.....	Standard Steel
	3	Baggage	63 ft. 3¾ in.	Steel	..	107,000	4	Electric	Company Shops
	1	Dining	80 ft. 3¾ in.	Steel	36	164,000	6	Electric	Company Shops
N. Y., Chicago & St. Louis.....	5	Coach	75 ft. 1½ in.	St. Und'frame	80	122,000	4	Electric	Pullman
	2	Baggage	63 ft. 3¾ in.	St. Und'frame	..	70,000	4	Electric	Pullman
	1	Business	73 ft. 6 in.	All Steel	..	.....	6	Electric	Pulman
N. Y., Ontario & Western.....	20	Coach	67 ft. 3 in.	All Steel	72	119,500	4	Electric	Osgood-Bradley
	4	Combination	78 ft. 4 in.	All Steel	52	119,100	4	Electric	Osgood-Bradley
	3	Bagg. & Exp.	64 ft. 8 in.	All Steel	..	106,000	4	Electric	Osgood-Bradley
	3	Bagg. & Mail	64 ft. 8 in.	All Steel	..	113,300	4	Electric	Osgood-Bradley
Norfolk & Western	7	Dining	74 ft. 8¾ in.	Steel	30	163,260	6	Electric	Pullman
Northern Pacific	70	Exp. Refr.	42 ft. 0 in.	St. Und'frame	..	.....	..	.....	Am. Car & Fdy.
Pennsylvania	20	Dining	78 ft. 0 in.	All Steel	36	154,000	6	Electric	Company Shops
	75	Coach	70 ft. 0 in.	All Steel	88	122,000	4	Electric	Pressed Steel
	65	Coach	70 ft. 0 in.	All Steel	88	122,000	4	Electric	Am. Car & Fdy.
	50	Coach	70 ft. 0 in.	All Steel	88	122,000	4	Electric	Standard Steel
	35	Pass. & Bagg.	70 ft. 0 in.	All Steel	44	129,000	6	Electric	Bethlehem
	25	Bagg. & Mail	70 ft. 0 in.	All Steel	..	129,000	6	Electric	Pullman
	2	Dining	70 ft. 0 in.	All Steel	30	169,000	6	Electric	Pullman
Pere Marquette	2	Coach	72 ft. 4½ in.	All Steel	84	109,000	4	Electric	Bethlehem
Philadelphia & Reading.....	45	Combination	72 ft. 4½ in.	All Steel	56	109,000	4	Electric	Bethlehem
	5	Baggage	74 ft. 4½ in.	All Steel	..	143,780	6	Electric	Bethlehem
	5	Baggage	66 ft. 6½ in.	All Steel	..	107,000	4	Electric	Am. Car & Fdy.
	5	Bagg. & Mail	66 ft. 6½ in.	All Steel	..	108,000	4	Electric	Am. Car & Fdy.
	40	Coach	.....	All Steel	..	.....	..	Electric	Bethlehem
	10	Pass. & Bagg.	.....	All Steel	..	.....	..	Electric	Bethlehem
	1	Business	.....	All Steel	..	.....	..	Electric	Bethlehem
Pittsburgh & West Va.....	9	Coach	79 ft. 10½ in.	All Steel	88	122,000	4	Electric	Am. Car & Fdy.
	1	Pass. & Bagg.	77 ft. 3½ in.	All Steel	44	129,000	6	Electric	Am. Car & Fdy.
	2	Pass. & Bagg.	77 ft. 3½ in.	All Steel	36	134,000	6	Electric	Am. Car & Fdy.
	2	Baggage	63 ft. 10½ in.	All Steel	..	103,000	4	Electric	Am. Car & Fdy.

Purchaser	No.	Class	Length	Construction	Seating capacity	Weight	Wheels per truck	Lighting	Builder
Pullman Company	20	Sleeping	73 ft. 6 in.	All Steel	..	..	6	Electric	Pullman
	6	Bagg. & Libr.	76 ft. 3½ in.	All Steel	28	..	6	Electric	Pullman
	24	Sleeping	73 ft. 6 in.	All Steel	..	..	6	Electric	Pullman
	60	Sleeping	73 ft. 6 in.	All Steel	..	159,000	6	Electric	Pullman
	20	Sleeping	73 ft. 6 in.	All Steel	..	158,500	6	Electric	Pullman
	20	Parlor	73 ft. 6 in.	All Steel	..	153,000	6	Electric	Pullman
	10	Sleeping	73 ft. 6 in.	All Steel	..	..	6	Electric	Pullman
	20	Sleeping	73 ft. 6 in.	All Steel	..	..	6	Electric	Pullman
	20	Parlor	73 ft. 6 in.	All Steel	..	..	6	Electric	Pullman
Rich., Fred. & Potomac	1	Dining	73 ft. 6 in.	All Steel	36	..	6	Electric	Pullman
	4	Coach	..	All Steel	..	..	..	Electric	Bethlehem
	6	Express	..	All Steel	..	..	..	Electric	Bethlehem
St. Louis-San Francisco	8	Chair	78 ft. 0 in.	Steel	72	133,000	6	Electric	Am. Car & Fdy.
	6	Coach	78 ft. 0 in.	Steel	88	130,700	6	Electric	Am. Car & Fdy.
Seaboard Air Line	4	Dining	73 ft. 6 in.	All Steel	36	156,000	6	Electric	Pullman
Southern Railway	40	Coach	78 ft. 2 in.	All Steel	82	132,000	6	Electric	Pullman
	10	Pass. & Bagg.	76 ft. 5 in.	All Steel	40	130,700	6	Electric	Pullman
	25	Bagg. & Exp.	64 ft. 6 in.	All Steel	..	106,500	4	Electric	Pullman
	25	Mail	64 ft. 6 in.	All Steel	..	115,000	4	Electric	Am. Car & Fry.
Tennessee Central	3	Bagg. & Mail	66 ft. 6½ in.	All Steel	..	..	4	Electric	Bethlehem
	3	Coach	72 ft. 2 in.	All Steel	78	..	4	Electric	Bethlehem
	3	Coach	72 ft. 2 in.	All Steel	78	..	4	Electric	Bethlehem
Toledo & Ohio Central	1	Bagg. & Mail	63 ft. 3¾ in.	Steel	..	114,000	4	Electric	Company shops
Union Pacific	25	Baggage	72 ft. 5½ in.	All Steel	..	120,000	6	Gas & Elec.	Am. Car & Fdy.
	20	Coach	79 ft. 3 in.	All Steel	84	140,400	6	Electric	Pullman
Wabash	8	Coach	81 ft. 8¾ in.	All Steel	88	128,800	6	Electric	Am. Car & Fdy.
	9	Chair	81 ft. 8¾ in.	All Steel	72	128,800	6	Electric	Am. Car & Fdy.
	8	Buff. Chair	81 ft. 8¾ in.	All Steel	38	128,800	6	Electric	Am. Car & Fdy.
	2	Cafe Chair	81 ft. 8¾ in.	All Steel	32	143,100	6	Electric	Am. Car & Fdy.
	4	Dining	82 ft. 2¾ in.	All Steel	36	159,500	6	Electric	Am. Car & Fdy.

Canada

Canadian National	1	Stm. Motor	50 ft. 7 in.	All Steel	46	60,000	4	Electric	Unit Ry. Car
	1	Edison St. Bat.	53 ft. 2 in.	All Steel	50	66,000	4	Electric	Ry. Stor. Bat.
	1	Edison St. Bat.	50 ft. 0 in.	All Steel	50	57,000	4	Electric	Ry. Stor. Bat.
	1	Edison St. Bat.	35 ft. 8 in.	All Steel	32	47,440	4	Electric	Ry. Stor. Bat.
Canadian Pacific	3	Compt. Sl.	81 ft. 10½ in.	All Steel	40	172,000	6	Electric	Can. Car & Fdy.
	50	Express Refr.	38 ft. 5 in.	St. Und'frame	..	88,000	4	..	Can. Car & Fdy.
	15	Bagg. & Exp.	82 ft. 4½ in.	All Steel	..	..	6	Gas	National Steel
	15	Mail	79 ft. 1 in.	All Steel	..	160,600	6	Gas	Can. Car & Fdy.

For Export

Argentine State Railways	1	Dynamometer	..	Steel	..	..	..	..	Burr Company
Canton-Kowloon Ry. (China)	2	Motor Cars	62 ft.	All Steel	65	80,000	4	Electric	Hall-Scott
	1	Coach	65 ft.	All Steel	65	60,000	4	Electric	Hall-Scott
Cuba Railroad	1	Business	..	..	..	..	..	..	Company Shops
Mexican	1	Private	71 ft. 6 in.	Wood	..	122,600	..	Gas & Elec.	..
	3	Saloon	76 ft. 10 in.	Wood	40	114,400	..	Gas & Elec.	..
National Railways of Mexico	10	2d Cl. Coach	45 ft. 8½ in.	All Steel	70	..	4	Gas & Oil	Pullman

Orders for Gasoline Rail-Motor Cars

Baltimore & Ohio	1	Motor Car	27 ft. 8 in.	All Steel	24	17,200	4	Electric	Edwards
	1	Trailer	23 ft. 0 in.	All Steel	34	9,350	4	Electric	Edwards
Black Mountain	1	Motor Car	..	Composite	34	..	..	Electric	J. G. Brill
Cambria & Indiana	1	Motor Car	..	Composite	48	..	..	Electric	Serv.-J. G. Brill
Cape Fear	2	Motor Car	..	Composite	26	..	..	Electric	J. G. Brill
	1	Trailer	..	Composite	40	..	..	Electric	J. G. Brill
Chesapeake Western	1	Motor Car	..	Composite	30	..	..	Electric	Serv.-J. G. Brill
Chic., Burlington & Quincy	1	Motor Car	..	..	..	..	..	..	Edwards
Chicago Great Western	1	Motor Car	30 ft. 0 in.	All Steel	26	..	4	Electric	Russell Co.
	1	Trailer	30 ft. 9 in.	All Steel	36	..	4	Electric	Russell Co.
	1	Motor Car	..	All Steel	46	..	4	Electric	Serv.-J. G. Brill
	3	Motor Cars	38 ft. 6 in.	All Steel	28	..	4	Electric	Russell Co.
	3	Trailer	36 ft. 0 in.	All Steel	44	..	4	Electric	Russell Co.
Coudersport & Pt. Allegheny	1	Motor Car	..	Composite	34	..	..	Electric	J. G. Brill
Fonda, Johnstown & Gloversville	2	Motor Car	..	Composite	46	..	..	Electric	Serv.-J. G. Brill
Great Northern	1	Motor Car	..	Composite	46	..	..	Electric	Serv.-J. G. Brill
	1	Motor Car	..	Composite	37	..	..	Electric	J. G. Brill
Jonesboro, Lake City & Eastern	1	Motor Car	34 ft. 5 in.	..	42	5,000	4 & 2	Electric	White-Brill
Knoxville & Carolina	1	Motor Car	..	Composite	46	..	8	Electric	Serv.-J. G. Brill
Maine Central	1	Motor Car	..	Composite	46	..	..	Electric	Serv.-J. G. Brill
Maryland & Penn.	2	Motor Car	..	..	..	..	..	..	Russell Co.
	2	Trailer	..	..	..	..	..	..	Russell Co.
New Orleans, Great Northern	1	Motor Car	..	Composite	33	..	..	Electric	Serv.-J. G. Brill
N. Y., New Haven & Hartford	2	Motor Car	58 ft. 9 in.	Steel	60	40,000	8	Electric	Russell Co.
Paris & Mt. Pleasant	1	Motor Car	..	Composite	40	..	..	Electric	J. G. Brill
Pennsylvania	2	Motor Car	..	Composite	46	..	..	Electric	Serv.-J. G. Brill
	1	Motor Car	..	Composite	42	..	..	Electric	Serv.-J. G. Brill
Philadelphia & Reading	1	Motor Car	42 ft. 6 in.	All Steel	46	28,000	8	Electric	Service
Pitts., Lisbon & Western	1	Motor Car	..	Composite	31	..	..	Electric	J. G. Brill
St. Louis-San Francisco	1	Motor Car	..	Composite	46	..	..	Electric	Serv.-J. G. Brill
Seaboard Air Line	1	Motor Car	..	Composite	30	..	..	Electric	Serv.-J. G. Brill
	1	Trailer	..	Composite	36	..	..	..	Serv.-J. G. Brill
Tennessee, Alabama & Ga.	1	Motor Car	..	Composite	46	..	..	Electric	Serv.-J. G. Brill
Toledo & Western	3	Motor Car	41 ft. 6 in.	Steel	49	27,000	4	Electric	Cincinnati
Virginia Blue Ridge	1	Motor Car	..	Composite	30	..	..	Electric	Serv.-J. G. Brill
Western Pacific	2	Motor Car	42 ft. 7½ in.	All Steel	46	28,000	4	Electric	Serv.-J. G. Brill
Western Union	1	Motor Car	..	Composite	8	..	..	..	J. G. Brill
Winchester & Western	1	Motor Car	28 ft.	St. Und'frame	30	12,000	6	Electric	Service

Canada

Canadian National	1	Motor Car	42 ft. 7¼ in.	St. Und'frame	46	26,000	4	Electric	Serv.-J. G. Brill
	1	Motor Car	26 ft. 6 in.	St. Und'frame	30	18,900	4	Electric	Ledoux-Jennings
	1	Motor Car	32 ft. 9 in.	St. Und'frame	34	23,000	4	Electric	Ledoux-Jennings
Grand Trunk	1	Motor Car	54 ft. 1½ in.	Steel	..	..	..	..	National Steel
Greater Winnipeg Water Dist.	1	Motor Car	42 ft. 6 in.	All Steel	46	28,000	8	Electric	Service
Quebec Central	2	Motor Car	26 ft. 0 in.	St. Frame	32	20,800	4	Electric	Led.-Jen'ngs, Ltd.

Exports

Tela Trys (Honduras)	1	Motor Car	..	Composite	31	Electric	J. G. Brill
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Dividend Changes on Railroad Stocks in 1922

Hopes for Increased Disbursements Not Realized in Most Cases—Northwestern Roads Reduce Rate

THROUGHOUT the better part of 1922, or at least during that period of several months' extent which ended about the middle of October when railway shares were regaining a measure of their former popularity, one of the leading factors of interest was the expectation or hope that a number of the more prosperous roads might increase their dividend rates. This contrasted sharply with conditions during 1921, because in that year there was considerable apprehension as to whether many railroad boards of directors would be able to declare their regular dividends.

The roads which at one time or another it was thought during 1922 might increase their dividend payments included such carriers as the Chesapeake & Ohio, which prior to the shopmen's strike was breaking records in handling non-union coal, and which, it was said, might establish a rate of 6 instead of 4 on its common stock, or the Atchison, Topeka & Santa Fe, or the New York Central, prosperous carriers paying low rates of dividends but reporting very favorable earnings. There was considerable optimism concerning the possibility that the Missouri Pacific might pay some of its cumulative preferred dividends. The Frisco was mentioned as a dividend possibility. For many months it was believed fairly certain that the Baltimore & Ohio would restore a rate of 4 per cent on its common stock because of the necessity of its so doing if it desired to maintain its bonds as legal investments for savings banks and trust funds in New York and other states. After the shopmen's strike had begun to affect net earnings as severely as it did, beginning in August and September, those in financial centers became less optimistic and this interesting situation passed into history with but a small amount in the way of practical realization of all the expectations.

The year 1922 showed an unusually large number of changes in dividend rates, even though none of the railroads mentioned above were included. Among the important developments of the year were, on the wrong side, the reduction from 7 to 5 per cent on Great Northern preferred, from 7 to 5 per cent on Northern Pacific common, and from 7 to 4 per cent on Minneapolis, St. Paul & Sault Ste. Marie, both preferred and common. On the other hand, improving railroad conditions as compared with 1921 permitted a restoration of the Southern Railway's 5 per cent preferred dividend and a restoration from 4 to 6 per cent on Pennsylvania common. The St. Louis Southwestern, in December, paid a semi-annual dividend of $2\frac{1}{2}$ per cent on its preferred stock, this being the first payment since 1914.

Some of the important changes in dividend rates which took place during the year were as follows:

Pennsylvania.—The stockholders of the Pennsylvania received during 1922 dividends totaling $4\frac{1}{2}$ per cent, including three quarterly dividends of one per cent and one, paid November 29, of one and one-half per cent. The Pennsylvania dividend rate was maintained at 6 per cent from 1899—except for 1906, when $6\frac{1}{2}$ per cent was paid, and for 1907, when 7 per cent was paid—until April 27, 1921, when the directors felt compelled, because of the unfavorable net earnings, to reduce the rate to 4 per cent. In 1922, Pennsylvania earnings were at a much improved level, with the result that the restoration of the former rate was thought to be advisable. For the first 11 months of 1922 the Pennsylvania System reported a net railway operating income of \$73,362,096, an increase of \$32,578,572 as compared with the same period of 1921.

St. Louis Southwestern.—On December 15, holders of the preferred stock of the St. Louis Southwestern received a semi-annual dividend of $2\frac{1}{2}$ per cent, this being the first dividend on this stock since April 15, 1914, when one-half of one per cent was paid. The Cotton Belt for some time has been reporting favorable and rapidly expanding net earnings, but hitherto, it has been the company's policy to put the net back into the property without paying any of it out in dividends.

Southern Railway.—This company in October declared a $2\frac{1}{2}$ per cent dividend on its preferred stock, thereby restoring the 5 per cent rate. This was the first dividend on this issue since December, 1920.

Great Northern.—Stockholders of the Great Northern received in 1922 one quarterly dividend of $1\frac{3}{4}$ per cent and one semi-annual payment of $3\frac{1}{2}$ per cent. The rate was continued at 7 per cent, but through the change from a quarterly to a semi-annual basis and the resulting omission of one of the quarterly dividends the payments to the stockholders during the year totaled only $5\frac{1}{4}$ per cent. Throughout a large part of the year it looked as if Great Northern net would improve sufficiently over that of 1921, so that the company would feel justified in maintaining the 7 per cent rate. The effects of the shopmen's strike and a falling off in ore traffic were among the leading factors which prevented the optimistic hopes from being realized. There were also uncertainties as concerns the rates on agricultural products. As a result, the directors on December 18 declared a semi-annual dividend of $2\frac{1}{2}$ per cent, thereby setting the dividend rate at 5 instead of at the 7 per cent rate which had been maintained without interruption since 1899. The $2\frac{1}{2}$ per cent dividend is payable February 1, 1923.

Northern Pacific.—Dividends were on a 7 per cent basis from 1903 to February 1, 1922. On March 22 the directors declared a quarterly dividend of $1\frac{1}{4}$ per cent and established a rate of 5 instead of the former 7 per cent. The Northern Pacific, like the other roads in the Northwest, has been reporting unfavorable net earnings from operation since 1918. Announcement by Howard Elliott, chairman of the board, at the time the cut in the rate was decided upon, said that the directors felt that in declaring a dividend of $1\frac{1}{4}$ per cent, they were best serving the interests of the stockholders and were hopeful that conditions would warrant the resumption of the rate of $1\frac{3}{4}$ per cent quarterly in the future. Northern Pacific had a standard return of approximately \$30,000,000, based on the average of the net railway operating income for the three years ended June 30, 1917. In the first 10 months of 1922 it had a net railway operating income of about \$10,500,000, which compared with about \$7,450,000 in the first 10 months of 1921.

Minneapolis, St. Paul & Sault Ste. Marie.—From 1909 to 1921 this company had been paying dividends at the rate of 7 per cent on both its preferred and common issues. On March 10, 1922, the directors adopted a resolution providing for the payment on April 15 of semi-annual dividends of 2 per cent on each class. The payments were to be made from surplus, the 1921 net not being sufficient to allow their being declared from income. The preferred stockholders at once protested, claiming that the 7 per cent dividends should be paid on the preferred stock before any payments were made on the common. A district court decision sustained the action of the directors, but because of an appeal to a higher court the matter is still in litigation.

Signal Construction Activities Show Improvement



"Signals Keep Trains Moving"

Work Completed, Underway and Proposed Is 100 Per Cent Greater Than Reported Last Year.

By K. E. Kellenberger

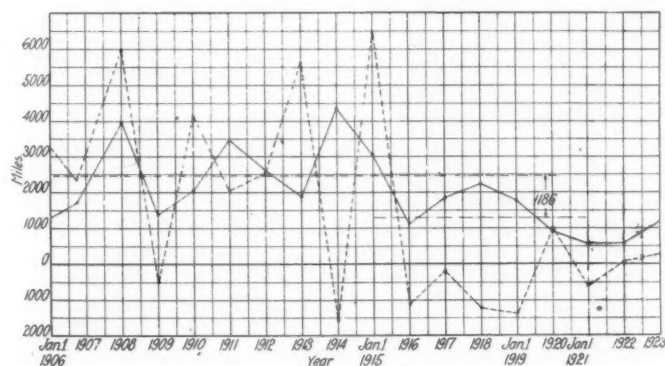


Interlockings Facilitate Traffic

THE YEAR 1922 has witnessed greater activities in automatic block signal construction work than any year since 1918. Work on new interlockings and on the rebuilding and rearranging of old plants has been carried on more extensively than at any time since 1919, while a greater mileage of manual block signaling was put in service than in any year since then. To the extent that signal construction can be taken as the barometer of conditions in the

In making a comparison of signal work completed with that of past years, a brief resumé is of service. It is interesting to note that the block signal mileage (manual and automatic) installed increased rapidly from 1906 to 1915. The construction curve flattened out materially in 1908 and again, although not to the same extent, in 1913. Construction work was carried on actively in 1914, but from 1915 to the present there has been a decided slump. One of the diagrams illustrates the trend in signal construction since 1906.

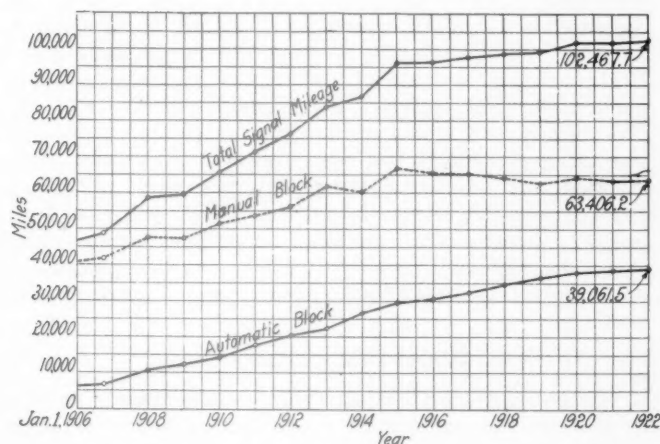
It is questionable whether the so-called normal rate of construction for the ten-year period mentioned above could be taken as a proper yardstick for the years since that time. During that period new lines were being built and railroad activities were expanding rapidly. Since that period the mileage of new lines built has been small, and the railroads have concentrated on intensive development work which is



Signal Construction Since 1905. Dotted Line, Manual Block; Solid Line, Automatic. Average Deficiency in Automatic Block Signal Miles Installed Is 1,186 Miles a Year Under That for Period, 1905-1914

railroad field, the increased amount of work is evidence of a healthier trend in railroad affairs. The low mark in block signal work was reached in 1920, when construction activities were lighter than during any year since 1905. In 1921 a slight improvement was noted, while the year just closed has witnessed approximately twice the amount of work completed, under way or contemplated twelve months ago. The prospects are bright for a largely increased amount of construction work in 1923.

Taking the ten-year period from 1905 to 1915 as normal in automatic signal construction and comparing it with that for the eight years from January 1, 1915, to January 1, 1923, we find the progress has been anything but satisfactory. The average mileage installed for the ten-year period preceding 1915 was 2,474.7 (I. C. C. reports), while for the eight-year period to date the average has been 1,288.4 miles. To overcome this deficiency in the next five years it will be necessary for the roads to install 4,736 miles each year.



Curves Showing Mileage of Block Signals Installed

evidenced in their signal construction programs. A study of this year's statistics shows that no extensive stretch of automatic block signals has been installed by any one road. Instead, short stretches of a few miles each have been installed at different points on a system, showing that the traffic delay points are being corrected so that increased track capacity may result. This work has consisted of station and curve protection, shortening of block sections, better facilities at approaches to yards, and the signaling of short sections in dense traffic territory. On the other

hand, there are railroads with extensive manual block mileage which will have to replace this with automatic block signals during the next few years to handle properly the increased traffic resulting from the building up of their territories. Because of the recent order of the Interstate Commerce Commission, automatic train control will be the outstanding feature in the signal field on a number of railroads this year.

Block Signaling Completed in 1922

A total of 1,532.8 miles of road in the United States and Canada was equipped with block signals (automatic and manual) during the past year. Part of the mileage represents new construction and a portion represents reconstruction and replacement. Where automatic signaling was in use previously the changes were due largely to resignaling certain stretches to obtain increased track capacity by providing for train operation by signal indication in either direction on the same track. Other changes consisted of replacing semaphore signals with light signals and the reconstruction of signal systems to provide for the addition of a second or third main track. Increased use of the welded rail bond to obtain greater track circuit efficiency is noted; and the use of the trickle charge in signal systems is advancing rapidly.

Comparing the figures of 1922 with those for 1921, published in the *Railway Age*, January 7, 1922, it is seen that there has been a decided increase in construction work of this character, as the total block signal mileage completed in the United States and Canada during 1922 was 1,532.8 as compared to 824 miles in 1921. Of this, 292 represents manual blocking and 1,240.8 miles automatic. This figure, however, is higher than the actual additional mileage installed, because in some cases the figures represent improvements made to installations already in service. The gross total mileage of automatic signals constructed or reconstructed is 626.6 miles more than in 1921, an increase of over 100 per cent. The total of 292 miles of manual blocking added in 1922 compares with 209.8 miles in 1921, an increase of 82.2 miles.

Block Signaling Under Construction

A comparison of the total mileage of block signals under construction in the United States and Canada on December 31, 1922, with that under construction on the same date in 1921, shows an increase of 302.7 miles, the mileage on December 31, 1921, being 174.9 in contrast with 477.6 now. The total mileage under construction on December 31, 1922, was entirely in the United States, no Canadian roads having reported any unfinished work. Of the work under way, 294.4 represents automatic block signaling and 183.2 miles manual. Some of the work going in replaces manual signals and some represents new construction, while in other cases it consists of the replacement of one type of apparatus with another.

Work Proposed for 1923

The automatic and manual block signal work proposed for the ensuing year contemplates that 1,326.9 miles of road will be equipped. Of this total, 1,031 miles is automatic and 295.9 manual. In making a comparison of the block signal mileage proposed for 1923 with that proposed one year ago, it is seen that there is an increase of 713.3 miles of road. All of the proposed mileage last year was for automatic block, 36 miles of which represented work on Canadian railways. These roads now report no proposed work for the coming year. However, the plans of many of the roads are indefinite, as their budgets have not been approved. It would appear that about twice the proposed mileage will be authorized unless there is a decided change in the conditions affecting the railroads.

The figures so far available, together with the data covering the work now under construction and planned for 1923 are shown in the accompanying tables under nine heads as follows:

A—Automatic Block Signaling Completed in 1922.
B—Automatic Block Signaling Under Construction.
C—Automatic Block Signaling Proposed for 1923.
D—Manual Block Signaling Completed in 1922.
E—Manual Block Signaling Under Construction.
F—Manual Block Signaling Proposed for 1923.
G—Interlocking Completed in 1922.
H—Interlocking Under Construction.
I—Interlocking Proposed for 1923.

NEW BLOCK SIGNALS COMPLETED IN 1922

Table A-D	Automatic (Table A)			Manual (Table D)			Both Total miles
	S. T. miles	D. T. miles	Total miles	S. T. miles	D. T. miles	Total miles	
United States....	795.7	401.6	1,197.3	283.6	8.4	292.0	1,489.3
Canada	26.5	17.0	43.5	....	....	....	43.5
	822.2	418.6	1,240.8	....	....	....	1,532.8

NEW BLOCK SIGNALS UNDER CONSTRUCTION ON DEC. 31, 1922

Table B-E	Automatic (Table B)			Manual (Table E)			Both Total miles
	S. T. miles	D. T. miles	Total miles	S. T. miles	D. T. miles	Total miles	
United States....	91.7	202.7	294.4	178.2	5.0	183.2	477.6
Canada .....	....	....	....	....	....	....	....

NEW BLOCK SIGNALS PROPOSED FOR 1923

Table C-F	Automatic (Table C)			Manual (Table F)			Both Total miles
	S. T. miles	D. T. miles	Total miles	S. T. miles	D. T. miles	Total miles	
United States....	822.6	208.4	1,031.0	295.9	....	295.9	1,326.9
Canada .....	....	....	....	....	....	....	....

INTERLOCKING PLANTS

Table G	No. of plants	Number of levers	
		Mechanical	Electric
Completed in 1922:			
United States.....	95	1,247	470
Canada	10	112	....
	105	1,359	470
Table H			
Under construction, Dec. 31, 1922:			
United States.....	46	358	438
Canada	3	50	....
	49	408	438
Table I			
Proposed for 1923:			
United States.....	34	356	258
Canada	8	90	....
	42	446	258
Total United States.....	175	1,961	1,166
Total Canada.....	21	252	....
Grand total.....	196	2,213	1,166

TOTAL CONSTRUCTION—FOURTEEN YEARS—I. C. C. REPORTS

	Miles of road		
	Construction of automatic block	Construction of manual block	Net addition to miles of road operated by block system
1908.....	1,387.6	—517.6	870.0
1909.....	2,047.1	4,162.2	6,209.3
1910.....	3,473.8	2,037.3	5,511.1
1911.....	2,623.4	2,517.2	5,140.6
1912.....	1,883.9	5,656.2	7,540.1
1913.....	4,350.5	—1,563.4	2,787.1
1914.....	3,294.2	6,577.5	9,871.7
1915.....	1,079.0	—1,112.0	—33.0
1916.....	2,012.1	—179.8	1,832.3
1917.....	2,238.5	—1,114.7	1,123.8
1918.....	1,796.3	—1,430.3	366.0
1919.....	979.4	1,007.1	1,986.5
1920.....	575.1	—575.7	—0.6
1921.....	517.6	66.5	584.1

Twenty-seven roads report having completed automatic block signal work. From the reports received, the largest mileage of automatic signals installed on any one road was on the Atchison, Topeka & Santa Fe, which put them in service on 311.5 miles of road—196.6 miles of single track and 114.9 miles of double. The next largest installations were made on the Great Northern, 176 miles single track and 12 miles double track, and the Chicago, Burlington & Quincy, 143.1 miles single track and 20.2 miles double track. The Canadian National lines installed 25.6 miles single track and 17 miles double track automatic.

Of the 12 roads reporting automatic block signal work under construction at the end of the year, the greatest

mileage given was 51 miles of single track and 48 miles of double track by the Northern Pacific. The Santa Fe has under construction 75.1 miles on double track, using 89 color light signals, while the Pennsylvania is installing 23 miles on double track, using 58 position light signals. The Illinois Central is changing over its two-track automatic block signaling to three-track signaling between Richton, Ill., and Peotone, in connection with the construction of its third track between Matteson, Ill., and Kankakee. On this work one track will be signaled for train operation in either direction and color light signals will replace the semaphore type heretofore in use. The trickle charge will be used on this installation.

Of the 15 roads reporting work proposed for 1923, the Great Northern contemplates the construction of 286 miles single track and 57 miles double track automatic. The Santa Fe has in view the construction of 233.2 miles single track and 70.5 miles double track signaling, using 356 semaphore signals on part of the work and color light signals on the remainder. The Los Angeles & Salt Lake (Union Pacific) contemplates 137 miles single track, while the Central of Georgia expects to install 77 miles single track. The Canadian railways do not report any work in prospect.

The manual block signaling installed during 1922 consisted of 283.6 miles of single track and 8.4 miles of double track, all of which was on the Pennsylvania system. The manual block signaling under construction at the end of the year consists of 178.2 miles of single track and 5 miles of double track; this work also is on the Pennsylvania. Under work proposed for 1923, the St. Louis-Southwestern plans to install 294.5 miles of single track block, using 26 signals, while the Chicago & Eastern Illinois expects to install 1.4 miles, single track, using 6 color light signals.

Automatic Train Control

An installation of 40 miles of single track color light signals and automatic train control was completed on the Chesapeake & Ohio between Charlottesville, Va., and Staunton. The train control is of the American Train Control Company's device, which is of the intermittent electrical contact type.

At the end of the year the Chicago & Northwestern is equipping 12 miles of road with the General Railway Signal Company's intermittent, non-contact induction type tapered train control. This installation includes both single and double track, mechanical and electric interlockings and is being put in between West Chicago, Ill., and Elgin. The Pennsylvania reports 44.4 miles of single and 5 miles of double track between Sunbury, Pa., and Lewistown as being equipped with the continuous induction type train control of the Union Switch & Signal Company. A power line is being built in connection with this installation and position light signals will be used.

Two roads report proposed installations of train control next year. The Santa Fe contemplates a proposed installation of the continuous induction type Union Switch & Signal Company train control on 102.8 miles of double track between Chillicothe, Ill., and Ft. Madison, Iowa. The Philadelphia & Reading reports a proposed installation of 56.2 miles between Camden, N. J., and Atlantic City, the type not yet having been decided on. A number of other roads have committees studying the different types of train control, looking to the recommendation of a type suitable for their service, announcement of which will be made by them later.

Interlocking Construction in 1922

There has been a good increase in the number of interlocking plants built or rebuilt, as compared with 1921. During the year just closed the United States reports 95 plants and Canada 10, as compared to 53 and 6 in 1921.

The number of plants under construction in the United States on December 31, 1922, was 46, and in Canada 3, as compared to 24 in 1921, none of which were in Canada. A total of 21 plants in the United States and 9 in Canada was proposed a year ago in comparison with 34 in the United States and 8 in Canada for the coming year.

Thirty-one roads built new interlocking plants or made changes in existing ones during the year just closed, affecting a total of 105 plants, 10 of which are in Canada. Of the 95 plants in the United States, it appears that 38 were rebuilt or rearranged and that 5 of the 10 plants in Canada had also been in service. This leaves a total of 57 new plants completed in the United States and 5 in Canada. The total number of mechanical levers reported as installed was 1,247 in the United States and 112 in Canada, but it appears that 208 of those in the United States were already in service, leaving a total of 1,039 new ones. In Canada 49 levers were in service, leaving a total of 63 new levers. The number of power levers installed in the United States was 470, of which 38 appear to have been in service, leaving 432 new power levers installed. No power levers were reported as having been installed in Canada.

In addition to the plants listed in the statistical table G, the Pennsylvania has made changes on four interlockings between Atglen and Downingtown in which no additional levers were involved but position light signals were substituted for semaphore signals and low pressure electro-pneumatic switches were substituted for high pressure ones, except on one outlying electric switch movement at Parkesburg and except at Coatesville where only the signals have been changed to position light, the switches remaining mechanical. At four other interlocking plants located between Camden, N. J., and Glassboro, position light signals have been substituted for semaphores.

Interlocking Construction Data

Table G gives the list of interlockings completed during the last year in detail. It is necessary that this be considered more as an exhibit of the work done than as showing the precise amount of the increase of such apparatus in use in the country, as some of the figures represent reconstruction and enlargements; also, some duplications necessarily occur as a plant may be reported by two or more roads. The same remarks apply also to tables H and I.

One outstanding feature of this year's report is the comparatively small size of the plants reported, which indicates that this class of construction is undergoing intensive rather than extensive development. A number of the mechanical plants have been converted into electro-mechanical ones by the addition of electric levers, thus obviating the necessity of enlarging interlocking towers where a second track is being laid. Considerable work has been done in replacing mechanical detector bars with electric detector locking, while approach and route locking has been added, with power distant signals, at other plants.

The largest electric plant installed during the year was one of 23 working levers at Schoharie Junction, N. Y., on the Delaware & Hudson. This plant replaces a mechanical plant of 8 levers. The next largest plant is one of 16 levers at Detroit, Mich., on the Michigan Central. The New York Central added 18 levers to an existing electric plant at North Tonawanda, N. Y. This road has also installed an "automatic" electric interlocking at a crossing at East New York Mills, N. Y. The Great Northern has completed an electric push-button control plant of 9 push-buttons at a junction with the Oregon-Washington Railway & Navigation Company in Washington.

The only electro-pneumatic plants completed are reported by the Pennsylvania, one having 19 working levers at Galitzin, Pa., replacing a mechanical plant; the other at Conestoga, Pa., having 8 levers. The last named is a consolida-

Block Signals Installed in 1922

[illegible]

C. C. C. & St. L.	Auto.	From	To	Miles of road	Number of signals			Type of signals			Battery			Control circuits			Lighting			Installed by			Remarks		
					Manual or automatic block, state which	Single track	Double track	Sema-phore	Light	Maker	Type or model	P. C. or D. C.	Primary or storage	Track, neutral line, polar line over-lap, A, P, B, T, D, B, (State which)	Oil or electric approach control or constant burning (state which)	Contractor	Railroad	Miles of road	Type	Including feature on line, trunking or bonding					
German town, N. Y., Lamington	Auto.																								
C. C. C. & St. L.	Auto.	Crestline		62.5				109																	
N. P.	Auto.	James town, N. D.	Eldridge	5				6																	
Penna. System	Auto.	Eldridge, N. D.	Mandan	99.5				199																	
		Atglen, Pa.	Downtown	15*																					
Eastern Region	Auto.	Egg Harbor, N. J.	Atlantic City	19.4																					
	Auto.	Camden, N. J.	Glassboro	17.7																					
Central Region	Auto.	Cresscut	Edenburgh	2				3																	
	Auto.	B. Q. Tower, O.	Earville	19																					
	Auto.	P. G. Duquesne, Pa.	East Pittsburgh	1.5																					
	Auto.	Pittsburgh, Pa.	Swissvale	7*																					
Greensburg, Pa.	Grade Sig. Aspects	Donohue		3.6*				6																	
Latrobe, Pa.	Grade Sig. Aspects	Donohue		5.1				10																	
Bolivar, Pa.	Grade Sig. Aspects	Gray		7.0				16																	
Sheridan, Pa.	Grade Sig. Aspects	W. of Br. No. 6		6.1				10																	
P. & R. A. C. R.		Hadden Heights, N. J.	Magnolia	2.7 (3 tk)																					
S. P.	Auto.	Dimmick, Ore.	Merlin	3.7				10																	
	Auto.	Bakersfield, Calif.	Mojave	17.4				34																	
Southern U. P.	Auto.	Morristown, Tenn.	New Line, Tenn.	1.3				2																	
O. S. L.	Auto.	Sandy, Utah	Silver Bow, Mont.					5																	
	Auto.	Granger, Wyo.	Pocatello, Ida.	7.6				6																	
	Auto.	King Hill, Ida.	Glenns Ferry, Ida	33																					
W. P.	Auto.	M. P. 29.35	M. P. 31.6	2.3				4																	
	Auto.	M. P. 178	M. P. 178.5	0.5				2																	
Totals				795.7	401.6	1,467	47.3	308	267																
Canada																									
Can. Nat.	Auto.	West Junction, Alta.	Bissell	3				7																	
G. T. P.	Auto.	G. T. P. Jct.	Battle	9				7																	
	Auto.	West Jct., Alta.	Alix	1.6				3																	
Eastern Lines	Auto.	Cadorna, Que.	Charney	12				18																	
C. P.	Auto.	London, Ont.		0.9																					
Total				26.5	17	18																			
Block Signals Under Construction January 1, 1923																									
A. T. & S. F.	Auto.	Yampa, Ariz.	Griffith	75.1				89																	
C. & W. I.	Auto.	Chicago, 19th St.	24th St.	0.6				2																	
C. & N. W.	Auto.	West Chicago, Ill.	Foris	5				20																	
I. C.	Auto.	67th St., Chicago	83rd St.	3.4				11																	
	Auto.	Fox Run, Ky.	Graham	15.7				30																	

Canada

From	To	Manual or automatic block, state which	Miles of road		Number of signals		Type of signals		Battery	Control circuits	Lighting	Installed by		Remarks
			Single track	Double track	Sema-phore	Light	Maker	Type or Model				D. C. or P. C. or Storage	Contractor		Railroad signal forces	Miles of road	Type
Richmon, Ill.	Peotone	Auto.	12*	12	4 dwarf	52	12	U.S.&S. M	D.C. Stor.	Track and neutral line	Oil or electric	Yes	Yes	*Two-track changed to 3-track, trackage charge
Y. & M. V.	Memphis, Tenn.	Auto.	6.3	8	4	4	4	U.S.&S. L	D.C. Prim.	Track	Oil	Yes	Yes	*Constant burning on Type L, independent pole line
M. K. & T.	Red River	Auto.	11	12	4	4	4	U.S.&S. L	D.C. Prim.	Track	Elec. approach	Yes	Yes	
Mo. Pac.	Ramapo, Kan.	Auto.	4	4	4	4	4	G.R.S. 2-A	D.C. Stor.	Track and line con-trol	Elec. approach	Yes	Yes	
N. Y. C.	Fonda, N. Y.	Auto.	11*	45	18	9	18	Hall L	D.C. Stor.	Neutral line	Oil	Yes	Yes	Renewals, *4-track Renewals
N. P.	Dillworth, Minn.	Auto.	44	65	103	7	7	G.R.S. 2-A	D.C. Prim.	Neut. tk. and line		G.R.S.	G.R.S.	
	Buffalo, N. D.	Auto.	51	4	7	7	7	G.R.S. 2-A	D.C. Prim.	Neut. tk. and line		G.R.S.	G.R.S.	
	Bloom, N. D.	Auto.	4	4	7	7	7	U.S.&S. 2-A	D.C. Prim.	Neut. tk. and line		G.R.S.	G.R.S.	
Penna. System	Sunbury, Pa.	Auto.	23	39	5	5	5	U.S.&S. B	Both Stor.	Polar line	Elec. constant	Yes	Yes	Replacing semaphores
U. P.	Earlville, O.	Auto.	9.3	39	5	5	5	U.S.&S. T-2	D.C. Stor.	Neut. tk. and line	Elec. approach	Yes	Yes	Replacing single track signals
O. S. L.	Glenns Ferry, Ida.	Auto.	5	5	5	5	5	U.S.&S. T-2	D.C. Prim.	A. P. B.	Elec. approach	Yes	Yes	
Wabash	Clymers, Ind.	Auto.	5	5	5	5	5	U.S.&S. T-2	D.C. Prim.	A. P. B.	Elec. approach	Yes	Yes	
Total			91.7	202.7	314	44	172	58						61.4

TABLE C-AUTOMATIC BLOCK SIGNALS PROPOSED FOR 1923

		Miles of road		Number of signals			Type of signals		Battery		Control circuits		Lighting		Installed by		Remarks																		
		Single track		Double track		Semaphore		Light																											
		Manual or automatic block (state which)				Upper quad.		Lower quad.		Color		Position		Maker		Type or model		Primary or storage		Track, neutral line, polar line overlap, A. P. B., T. D. B. (state which)		Oil or electric approach control or constant Burning (state which)		Contractor		Railroad signal forces		Miles of		Type		Including feature on line, trucking or bonding			
From		To																																	
A. T. & S. F.	Chillicothe, Ill.	Auto.	28.8	42	61	61	61	61	61	U.S.&S. T-2	D.C. Prim.	Polar track	Elec. approach	Yes	Yes	102.8 Cont.																			
	Bucklin, Mo.	Auto.	41.7	61	61	61	61	61	61	U.S.&S. T-2	D.C. Prim.	Polar track	Elec. approach	Yes	Yes																				
	"HU" Tower, Kan.	Auto.	18.3	61	61	61	61	61	61	U.S.&S. T-2	D.C. Prim.	Polar track	Elec. approach	Yes	Yes																				
	Nulvane, Kan.	Auto.	6.7	61	61	61	61	61	61	U.S.&S. T-2	D.C. Prim.	Polar track	Elec. approach	Yes	Yes																				
	Norfolk, Okla.	Auto.	2	61	61	61	61	61	61	U.S.&S. T-2	D.C. Prim.	Polar track	Elec. approach	Yes	Yes																				
	Caney, Kan.	Auto.	2	61	61	61	61	61	61	U.S.&S. T-2	D.C. Prim.	Polar track	Elec. approach	Yes	Yes																				
	Aperson, Okla.	Auto.	27	61	61	61	61	61	61	U.S.&S. T-2	D.C. Prim.	Polar track	Elec. approach	Yes	Yes																				
	Ardmore, Okla.	Auto.	30	61	61	61	61	61	61	U.S.&S. T-2	D.C. Prim.	Polar track	Elec. approach	Yes	Yes																				
	No. Ft. Worth, Tex.	Auto.	37.4	61	61	61	61	61	61	U.S.&S. T-2	D.C. Prim.	Polar track	Elec. approach	Yes	Yes																				
	Morgan, Tex.	Auto.	30	61	61	61	61	61	61	U.S.&S. T-2	D.C. Prim.	Polar track	Elec. approach	Yes	Yes																				
	Griffith, Ariz.	Auto.	68.3	61	61	61	61	61	61	U.S.&S. T-2	D.C. Prim.	Polar track	Elec. approach	Yes	Yes																				
	Badgad, Calif.	Auto.	8.7	61	61	61	61	61	61	U.S.&S. T-2	D.C. Prim.	Polar track	Elec. approach	Yes	Yes																				
	Dalies, N. M.	Auto.	15.8	61	61	61	61	61	61	U.S.&S. T-2	D.C. Prim.	Polar track	Elec. approach	Yes	Yes																				
	Paces, N. M.	Auto.	15.8	61	61	61	61	61	61	U.S.&S. T-2	D.C. Prim.	Polar track	Elec. approach	Yes	Yes																				
	Gallup, N. M.	Auto.	15.8	61	61	61	61	61	61	U.S.&S. T-2	D.C. Prim.	Polar track	Elec. approach	Yes	Yes																				
	Blaine, N. M.	Auto.	15.8	61	61	61	61	61	61	U.S.&S. T-2	D.C. Prim.	Polar track	Elec. approach	Yes	Yes																				
	Defiance, Ariz.	Auto.	15.8	61	61	61	61	61	61	U.S.&S. T-2	D.C. Prim.	Polar track	Elec. approach	Yes	Yes																				
	Ashtley Draw, Ga.	Auto.	15.8	61	61	61	61	61	61	U.S.&S. T-2	D.C. Prim.	Polar track	Elec. approach	Yes	Yes																				
	Burroughs, Ga.	Auto.	15.8	61	61	61	61	61	61	U.S.&S. T-2	D.C. Prim.	Polar track	Elec. approach	Yes	Yes																				
	Isap, Ga.	Auto.	15.8	61	61	61	61	61	61	U.S.&S. T-2	D.C. Prim.	Polar track	Elec. approach	Yes	Yes																				
	Manly, Ga.	Auto.	15.8	61	61	61	61	61	61	U.S.&S. T-2	D.C. Prim.	Polar track	Elec. approach	Yes	Yes																				
	Albany, Ga.	Auto.	15.8	61	61	61	61	61	61	U.S.&S. T-2	D.C. Prim.	Polar track	Elec. approach	Yes	Yes																				
	"DJ" Tower, Ga.	Auto.	15.8	61	61	61	61	61	61	U.S.&S. T-2	D.C. Prim.	Polar track	Elec. approach	Yes	Yes																				
	Kelley's Ave., Ky.	Auto.	15.8	61	61	61	61	61	61	U.S.&S. T-2	D.C. Prim.	Polar track	Elec. approach	Yes	Yes																				
	Fulton, Ky.	Auto.	15.8	61	61	61	61	61	61	U.S.&S. T-2	D.C. Prim.	Polar track	Elec. approach	Yes	Yes																				
	Clarkdale, Miss.	Auto.	15.8	61	61	61	61	61	61	U.S.&S. T-2	D.C. Prim.	Polar track	Elec. approach	Yes	Yes																				
	Wenatche, Wash.	Auto.	15.8	61	61	61	61	61	61	U.S.&S. T-2	D.C. Prim.	Polar track	Elec. approach	Yes	Yes																				
	Reckentridge, Idaho	Auto.	15.8	61	61	61	61	61	61	U.S.&S. T-2	D.C. Prim.	Polar track	Elec. approach	Yes	Yes																				
	Springfield, Idaho	Auto.	15.8	61	61	61	61	61	61	U.S.&S. T-2	D.C. Prim.	Polar track	Elec. approach	Yes	Yes																				
	Hillsboro, Tex.	Auto.	15.8	61	61	61	61	61	61	U.S.&S. T-2	D.C. Prim.	Polar track	Elec. approach	Yes	Yes																				
	Temple, Tex.	Auto.	15.8	61	61	61	61	61	61	U.S.&S. T-2	D.C. Prim.	Polar track	Elec. approach	Yes	Yes																				
	Granger, Tex.	Auto.	15.8	61	61	61	61	61	61	U.S.&S. T-2	D.C. Prim.	Polar track	Elec. approach	Yes	Yes																				

N. Y. C. & St. L. Vermillion, O.		2	4	W. U. poles Details not known
P. & R.	Auto.	...	...	...
A. C. R.	Auto.	...	...	...
U. P.	Euclid, O.	...	...	...
L. A. & S. L.	Atlantic City...	60	106	56.2
L. A. & S. L.	Las Vegas, Nev.	77	142	...
K. C.	Guelph	...	...	...
H. M.	Kelso, Calif.	...	...	...
O. S. L.	Daguer	9	42	...
Virginian	Reverse	...	...	...
Mullens, W. Va.	Clarks Cap.	17	42	...
Total		822.6	208.4	159.

TABLE D—Manual Block Signals Installed in 1922

From	To	Miles of road	Number of signals			Type of signals		Control circuits	Lighting	Installed by			REMARKS
			Sema- phore	Light	Maker	Type or model	D. C. or A. C.			Battery, Primary or storage	Contractor	Miles of road		Train control
Penna System....	"N." Cabin, O.....	Cambridge Shop.....	8.6								Yes	Type	Including feature or line, trunking or bonding
				Upper quad.	Lower quad.	Color light	Position light						3 pos. bl. sigs. replacing 2 pos. stop signals
Cent. Region....	Washington, Pa.....	Waynesburg	28.2										10 unattended block sta.
	C. L. & N. Xing, O....	Dover	0.2			1					Yes		3 pos. bl. replacing 2 pos. stop
	R. S. Cabin.....	Center Ave.....	0.7										Two unattended block sta.
	Center Ave.....	Cherry Valley.....	4.0										Two unattended block sta.
	Center Ave.....	Atlasburg.....	3.5										Four unattended block sta.
	Langeloth Jct.....	Langeloth	1.4										One unattended block sta.
	Cadiz Jct, O.....	Cadiz	7.9										Four unattended block sta.
	Terminal, Jct. O.....	N. Y. C. Jct., Wheeling	4.4			2					Yes		Block system put in force—no signals.
	Bellaire, O.....	Zanesville	110.5										Block giving through unattended telephone block stations
S. W. Region..	F. O. Tower, Ind.....	Terre Haute Station..	0.5	2							Yes		
	High St. Columbus, O. G. R. Tower.....		0.9	2							Yes		
	High St. Columbus, O. S. Y. Tower.....		1.7	2							Yes		
	Third St., Dayton, O.....	Fifth St.....	0.5										
	Miami City Jct., O.....	W. C. Tower.....	.8	1							Yes		
	O.D. Tower, Cincinnati, O. Pt. Isabella.....		1.7	2							Yes		
	M. R. Richmond, Ind.....	12th Street.....	0.3	1							Electric		
	Lancaster, O.....	Morrow	89.2		21						Yes		
	Xenia, O. "W. X."		1.0										
	Xenia, O. "X. Y."		0.8										
N. W. Region..	Carleton, Mich.....	Detroit	25.2	8							Yes		Moved

TABLE E—Manual Block Under Construction, January 1, 1923

Penna. System, Farrington, Ill.	76.5	26	Mech.	Oil	Yes
S. W. Region, Maroa, Ill.	51.5	20	Mech.	Oil	Yes
Cincinnati, O.	50.2	18	Mech.	Oil	Yes
Total	178.2	46			

TABLE F—Manual Block Proposed for 1923

[illegible]

tion of two plants in which 17 mechanical levers were abandoned.

Sixteen electro-mechanical plants were reported as completed or additional levers added while on five others additional electric levers were added. Of the new plants installed, the three largest are on the Illinois Central at Manteno, Ill., with a total of 38 levers; at Peotone, Ill., with 34 levers, and at Tucker, Ill., with 30 levers. These plants are part of the new three-track signaling going in on this road. The Big Four installed a plant of 24 levers at Parker City, Ind., and the Chesapeake & Ohio one of 20 levers at Hinton, W. Va.

The largest mechanical plant installed was at the crossing of the Missouri Pacific and the St. Louis-San Francisco at Aurora, Mo., 42 working levers. The next two largest plants completed were by the Missouri Pacific at Kenneth, Kan., and at Hiawatha, Kan., 27 and 25 working levers, respectively. The Grand Trunk put in service a mechanical plant of 20 working levers at Hamilton, Ont. Other plants range in size from 3 levers up to those mentioned above. Other mechanical plants are listed in the table with a greater number of working levers, but they represent additions, not new plants. Two plants installed are of the cabin door lock type with power distant signals. Others are equipped with time locks, electric and detector locking, power signals and check locking.

Interlocking Plants Under Construction

Eighteen roads, two of which are in Canada, report interlocking as under construction at the end of the year. In the United States 46 plants are under way, 15 of which represent those being rebuilt or enlarged, leaving 31 new plants under way. Three new interlockings are being installed in Canada. The largest electric plant under construction on December 31, 1922, was at Homewood, Ill., on the Illinois Central, 50 working levers. This plant is being equipped with color light signals, route and approach locking and color light signals. The next in size is one having 20 working levers at Atlantic City, N. J., on the Philadelphia & Reading. The Delaware & Hudson has under way the construction of a 57-lever electric plant at Mechanicsville, N. Y., replacing a 34-lever mechanical machine, while the Chicago, Rock Island & Pacific is adding 20 levers to a 36-lever machine at Des Moines, Ia.

The Interborough Rapid Transit Company of New York has three electro-pneumatic plants under construction, one at 180th street, White Plains road, of 44 levers; another at Livonia avenue, 32 levers, and a third at New Lots avenue, Eastern Parkway, 10 levers. The Pennsylvania has under construction a plant of 40 levers at Aspinwall, Pa., while the Philadelphia & Reading is constructing one of 32 levers at Harrisburg, Pa.

The largest electro-mechanical plant under construction is one at Monee, Ill., on the Illinois Central consisting of 36 levers; route locking and color light signals are features of the plant. The next largest plant under construction is at Green Springs, Ohio, on the New York, Chicago & St. Louis with 30 working levers. The Pennsylvania is consolidating some plants, abandoning mechanical levers and adding electric levers. The largest mechanical plant under construction is one having 32 working levers at North Edmonton, Alta., on the Canadian Pacific, while the second largest is one having 27 working levers at Schenectady, N. Y., on the Delaware & Hudson. The third largest plant is one of 18 working levers at Moncton, N. B., on the Canadian Pacific, while the next in point of size are two of 13 working levers each at Analin, Minn., and at Buffington, Minn., on the Northern Pacific.

Proposed Interlocking Work

Of the 34 plants proposed for the ensuing year, in the United States, it appears that 13 are to be rebuilt or enlarged,

leaving 21 as new interlockings. In Canada, 8 plants are proposed, 4 of which are to be rebuilt. Under table I, showing this work in detail, 356 mechanical levers are involved and 258 power levers, in the United States, while in Canada 90 mechanical levers are to be installed, no power levers being listed. In the United States, 36 mechanical levers are reported as already in service on an existing plant, and this reduces the actual number of new mechanical levers to 320.

Of the plants proposed for 1923, the largest electric plant is one of 38 working levers to be located at Oneonta, N. Y., on the D. & H. This plant will replace a 21 lever mechanical machine. The next in point of size is one of 25 working levers at Eldorado, Kan., on the Atchison, Topeka & Santa Fe, while the Wabash intends to rebuild and add functions to an existing plant at Detroit, Mich.

The Interborough Rapid Transit Company reports the proposed construction of two electro-pneumatic plants of 52 and 50 levers respectively. These are to be located at 240th street, White Plains road, and at Jerome avenue.

The largest electro-mechanical plant in prospect is one of 15 mechanical and 8 electric levers at North Tower, Ga., on the Atlantic Coast Line. The next largest is one of 13 mechanical and 4 electric levers at Lynchburg, Va., on the Chesapeake & Ohio, while the third largest is one of 8 mechanical and 8 electrical levers at Hardeeville, S. C., on the A. C. L. Of the mechanical plants under consideration, the largest is contemplated at Schuylkill Haven, Pa., on the P. & R. to have 35 working levers. The next largest plant is one of 29 working levers at Pomona, Va., on the Southern, while the third in point of size consists of a plant of 24 working levers on the Canadian National at Harrowsmith, Ont. Approach, route and detector locking will be features of many of the plants.

Outlying Electric Switch Movements

That the advantages to be gained from installations of electric switch movements at outlying switches are being more generally recognized is evidenced by the reports showing this class of equipment put in, under construction or contemplated. Seven roads report 15 outlying switches so equipped during the year just closed, while four roads report 19 as under construction at the end of the year and two roads contemplate installing 4 layouts in 1923.

The Pennsylvania completed five locations, and the Great Northern, four. Of the switch movements under construction on December 31, 1922, the Pennsylvania is working on nine, while the Missouri Pacific has eight. Of those contemplated next year, the Atlantic Coast Line expects to put in two at Chatham, Ga., at the end of double track, while the C. & O. will have two on turnouts at Ashland, Ky.

The General Outlook

In order to get a consensus of opinion from signal department officers regarding the mileage of automatic signals and the number of interlocking plants which should be installed during the coming year to meet the traffic conditions adequately, a request was made for this information. Of the 41 roads replying, 27 with a combined mileage of 87,436 indicated that approximately 2,900 miles of automatic signals and 70 interlockings should be installed. However, if such an extensive construction program were to be undertaken by railroad forces the insufficient supply of labor would limit operations in certain sections of the country. There appears to be a shortage not only of properly trained signal men but of common labor also. In this connection one signal department officer has expressed the opinion that this shortage of trained men has resulted from the standardization of wages and working agreements; the resultant lack of vacancies has prevented new men from entering the field.

In a few cases signal construction also seems to have been

Interlocking Plants Installed in 1922

Name of road	Location	Layout— crossing, junction, terminal, etc.	Working levers				Electric switch move- ments on outlying switches	Remarks on special features
			Mechanical	Electric	Pneumatic	Electro- mechanical		
A. C. L.	Drayton, S. C.	Draw. Br.	...	...	...	4	2	Approach, route and detector locking.
	Boydville, Ga.	Crossing	6	...	...	...	...	Door locked.
	Gilman, S. C.	Crossing	6	...	...	...	...	Door locked power dist. sigs.
B. & O.	Dearborn, Ind.	Crossing	20	...	...	...	...	Rearrangement.
	Columbus, O.	Crossing	...	59	...	...	...	Rearrangement.
	East Youngstown, O.	Crossing	3	...	...	...	...	Rebuilt.
	Shelby Jct., O.	Junction	61	...	...	...	...	Rearrangement.
	Whiting, Ind.	Junction	...	57	...	...	...	Detector and route locking added.
B. & M.	No. Lawrence, Mass.	Crossing	...	...	...	7	4	2
C. B. & Q.	West Eola, Ill.	End yard	53	...	...	...	...	Intog. moved 800 ft.—14 levers added. Detector locking installed.
	Eola, Ill.	End yard	6	...	...	...	...	Six levers added for yard lead and crossovers.
	Sorento, Ill.	Crossing	27	...	...	...	...	Double track through plant. Six levers added with detector locking.
C. R. I. & P.	Iowa City, Ia.	End. bbl. tk.	...	4	...	...	...	1 H. V. Sw. Mach. replaced by L. V.
	Carnforth, Ia.	Crossing	22	...	...	...	...	New machine and tower acc. fire.
C. & S.	Denver, Col.	Crossing	...	Elec.	...	...	...	Secondary line halts to throw switches with electrically block traffic on other line.
C. & O.	Hurricane, W. Va.	Crossover	12	2	...	16	10	Rebuilt, traffic lock levers added.
	D. K. Cabin, W. Va.	Crossover	...	...	...	9	11	2
	Hinton, W. Va.	Terminal	...	...	...	...	...	42 lever machine, Federal.
D. & H.	Schoharie Jct., N. Y.	Junction	...	23	...	...	...	Changed from 8-lever mch. plant. Approach route and detector locking.
Erie	Newark, N. J.	Draw	...	11	...	...	...	Detector circuits.
G. N.	Lamona, Wash.	Junction	4	...	...	...	...	End of double track switch.
	Bluestem, Wash.	Junction	4	...	...	...	...	...
	Columbia Falls, Mont.	Junction	1	1	...	...	...	...
	Spring Brook, N. D.	Junction	2	...	...	...	...	...
	Loop Tower, Wis.	Junction	...	4	...	...	...	...
	Huson, Mont.	Bridge Gauntlet	...	...	...	...	...	3 mos. levers. App. and route locking.
	State Line, Minn.	Crossing	4	1	...	...	...	Gauntlet trk. Automatic intrl. smashboards and torpedo machines.
	Interbay, Wash.	Spurs	7	...	...	...	...	Added to existing plant.
	Ft. Wright, Wash.	Junction	...	4	...	...	...	Lock up cabin inter-locking.
	Minot, N. D.	Junction	12	...	...	...	...	Low-voltage switch and derrails.
	Minot, N. D.	Out. switch	...	2	...	...	...	Rebuilt and 12 levers added.
	O. W. R. & N., Wash.	Junction	...	9	...	...	...	1 End of passing track entering A. P. B.
			...	...	...	...	...	1 End ddl. track push button control.
G. T. (Eastern Lines)	Woodstock, Ont.	Crossing	17	...	...	...	...	Detector lock, electric distant signals.
	Hamilton, Ont.	Junction	20	...	...	...	...	Detector lock, electric distant signals.
	Ottawa, Ont.	Terminal	...	2	...	...	...	1 Detector lock, electric distant signals.
	Port Robinson	Gauntlet	...	1	...	...	...	Power home and distance signals.
I. C.	Manteno, Ill.	Crossover	...	...	...	30	8	Route locking. Color light signals on plant.
	Tucker, Ill.	Crossover	...	...	...	24	6	Route locking. Color light signals on plant.
	Pectone, Ill.	Crossover	...	...	...	27	7	Route locking. Color light signals on plant.
	Kankakee, Ill.	Crossing & Jct'n.	...	3	...	...	...	Plant rebuilt. 3-levers added. 48 lever frames.
Lehigh & New Eng.	Bath, Pa.	Xing, D. L. & W.	6	...	...	...	...	Route locking.
	Nazareth, Pa.	Xing, D. L. & W.	5	...	...	...	...	Power signals and electric time locks.
M. St. P. & S. S. M.	Shawano, Wis.	Crossing	14	...	...	...	...	Power signals and electric time locks.
	Minot, N. D.	Crossing	32	...	...	...	...	One electric distance signal.
M. K. & T.	Hallett, Okla.	Crossing	6	...	...	...	...	12 levers added to 20-lever machine.
Mo. Pac.	St. Louis, Mo.	Crossing	...	3	...	...	...	Approach and detector locking U. Q. power signals on M. K. & T.
	Kenneth, Kan.	Crossing	27	...	...	...	...	Detector—3 working.
	Hiawatha, Kan.	Crossing	25	...	...	...	...	Approach and detector locking. Two electric sigs.
	Dudley, Mo.	Crossing	19	...	...	...	...	Approach and detector locking. Four electric sigs.
	Columbia, La.	Dr. bridge	8	...	...	...	...	Approach and detector locking. Two electric sigs.
	Alexandria, La.	Dr. bridge	...	...	...	...	...	Approach and detector locking.
	Worland, Mo.	Crossing	13	...	...	...	...	Approach and detector locking. Two electric sigs.
	Aurora, Mo.	Crossing	42	...	...	...	...	Approach and detector locking. Three electric sigs.
	Claremore, Okla.	Crossing	19	...	...	...	...	Approach and detector locking. Three electric sigs.
N. P.	Bismarck, N. D.	Crossing	...	...	...	...	...	Approach and detector locking, power signals.
N. Y. C. System	No. Tonawanda, N. Y.	Crossing	...	56	...	...	...	18 working levers added to existing plant.
Lines East	Tonawanda, N. Y.	Crossing	...	55	...	...	...	7 working levers added to existing plant.
	No. Tonawanda, N. Y.	Junction	...	27	...	...	...	Rebuilt electric signals.
	E. New York, Mills	Crossing	...	Auto	...	...	...	Automatic electric intlg. 13 signals replaced mech. plant destroyed by fire.
Lines West	Handy, Ind.	Crossing	48	...	...	...	...	Electric distant signals. Plant rebuilt.
C. C. C. & St. L.	Parker City, Ind.	Block station	...	...	...	18	5	Approach and detector locking. Semi-automatic signals.
Mich. Cent.	Detroit, Mich.— Buchanan St.	...	...	16	...	...	...	Route locking.
	Detroit, Mich.— Charlevoix Ave.	...	...	...	...	7	5	Route locking.
	Detroit, Mich.— Palmer Ave.	...	...	10	...	...	...	Route locking.
Penn. System	Rockville, Pa.	Junction	...	...	...	...	2	1* Abandoned 6 mech. levers, added 2 elec. levers.
			...	...	...	...	...	*Substituted for mech. consolidation of two plants.
Eastern Region	Columbia, Pa.	Outlying	...	...	...	3	3	1 Addition to existing plant.
	Williamsport, Pa.	Outlying	...	...	...	...	3	1 Consolidation of two plants. Two mech. levers abandoned.
	Shenks Ferry, Pa.	Outlying	...	...	...	8	2	Levers added.
	Conestoga, Pa.	Outlying	...	...	...	...	...	Consolidation of two plants—17 mech. levers abandoned. Eight added.
	Reading, Pa.	Outlying	...	...	...	...	5	2* Consolidation of three plants—15 mech. levers abandoned. *Sub. for mech.
	18 various plants.	...	...	...	...	...	73	Replacing mech. detector bars with electric detector locking.

Name of road	Location	Layout—Crossing, junction, terminal, etc.	Working levers			Electric switch movements on outlying switches	Remarks on special features	
			Mechanical	Electric	Electro pneumatic			
Central Region.....	"JO" McDonald, Pa.	Outlying	...	...	32	7	7 S 8 elect. units added to existing machine.
	"SB" Wheeling Jct., W. Va.	Junction	...	...	28	7	7 S 8 elect. units added to existing machine.
	"NA" New Alexandria, Pa.	Outlying	...	...	13	3	3 S 8 elec. units added to existing machine.
	"MR" Miller, Pa.	Outlying	...	...	13	3	3 S 8 elec. units added to existing machine.
	"RD" Black Run, Pa.	Outlying	...	...	16	3	3 S 8 elec. units added to existing machine.
	"UN" Gallitzin, Pa.	...	...	19	...	...	Replacing mechanical plant. Complete approach and route locking.
N. P.....	Bismark, N. D.	Crossing	...	...	...	...	Power signals and approach electric locking added.
P. & R.....	Essington, Pa.	Drawbridge	...	...	2	5	Approach, route and detector locking.
Atlantic City R. R.	Hadden Heights, N. J.	Junction	13	...	...	...	Approach, route and detector locking.
	Magnolia, N. J.	Junction	13	...	...	...	Approach, route and detector locking.
St. L.—S. F.....	Aurora, Mo.	Crossing Mo. P.	42	...	...	...	{ Stick, approach, route and detector locking. 3 electric distant signals controlled by push buttons.
	Claremore, Okla.	Crossing Mo. P.	19	...	...	...
Southern	Morristown, Tenn.	Junction	5	...	...	...	Rebuilt, 12 levers added.
	New Line, Tenn.	Junction	20	...	...	...	Detector locking to replace bars.
	Cameron Run, Va.	Junction	23	...	...	...
S. P.....	West San Jose, Calif.	Crossing	20	...	...	...	Approach detector locking electric signals.
	Valbrick, Calif.	Crossing	17	...	...	...
Union Pacific.....	Aspen, Wyo.	...	20	...	...	...	{ Check lock through tunnel controlled from each tower.
	Altamont, Wyo.	...	21	...	...	...
	Council Bluffs, Ia.	...	84	...	...	...	12 levers added and rebuilt.
	Council Bluffs, Ia., Tower B.	...	16	...	...	...
Wabash	Detroit, Mich.	...	10	...	...	...	U. S. & S. Type F. Electric.
Western Pacific.....	Valbrick, Calif.	Crossing	17	...	...	...	Electric locking.
	West San Jose, Calif.	Crossing	20	...	...	...	Approach route and detector locking.
W. & L. E.....	Steuersville, O.	Crossing	3	...	...	...	Dwarf machine without mechanical locking. With electric lock. Signals operated and lighted electrically—110 volt 60 cycle.
Total			998	268	27	249	175	15

CANADA

C. P.....	Hull West, Que.	Crossing	4	...	...	...	Half interlocking.
	Peterboro, Ont.	Crossing	3	...	...	...	Half interlocking.
	St. Polycarpe Jct.	Crossing	29	...	...	...	Reconstruction, approach, route and detector locking.
Can. Nat.....	West Junction	...	10	...	...	...	Route and detector locking. Semi-automatic signals govern entrance to A. P. B.
	Allenby Jct., Que.	Crossing & Jct.	25	...	...	...	Five levers added.
	Joliette, Que.	Crossing	13	...	...	...	Rebuilt.
	Limoilou, Que.	Crossing	2	...	...	...	Four gates.
	Belleville, Que.	Crossing	7	...	...	...	Rebuilt with 2 gates added.
	Smith Falls, Ont.	Drawbridge	4	...	...	...	Two electric signals.
	Iweed, Ont.	Crossing	15	...	...	...	Rebuilt.
Total			112	...	...	...

Interlocking Plants Under Construction January 1, 1923

Name of road	Location	Layout—Crossing, junction, terminal, etc.	Working levers			Electric switch movements on outlying switches	Remarks on Special Features
			Mechanical	Electric	Electro-pneumatic		
A. C. L.....	Washington, N. C.	Crossing	2	...	...	...	Approach, route, detector locking, electric signals at mechanical plants. State if all now work, or if plant rebuilt, number of levers added
Ann Arbor.....	Hallet, O.	Crossing	...	...	...	...
	Boulevard, O.	Crossing	...	...	...	...
	Alixis, Toledo, O.	Crossing	...	...	...	...
C. R. I. & P.....	Des Moines, Ia.	Crossing, jct.	...	20	...	...	Twenty levers added to 36-lever machine. Route and detector locking.
	Alta Vista, Kan.	Pass. Track	...	2	...	...	1 Desk circuit con. Route and detector locking.
C. & O.....	Scott, W. Va.	Crossovers	...	...	7	6	Sixteen-lever U. S. & S., S-8 machine.
D. & H.....	Mechanicsville, N.Y.	Junction	...	57	...	...	Changed from 34 lever mech. mach. Approach, route and detector locking.
	Schenevus, N. Y.	Junction	27	...	...	...	Approach, route and detector locking. Elec. dist. sigs.
G. N.....	Cut Bank, Mont.	Junction	...	6	...	...	Approach and route locking.
	Bridge No. 10.	Drawer	10	10	...	...
I. C.....	Monee, Ill.	Crossover	...	...	29	7	Route locking, color light sigs.
	Homewood, Ill.	Crossover & yard	...	50	...	...	Approach, route and detector locking.
I. R. T.....	180th Street, White Plains	...	...	44	...	...
	New Lots Ave., Eastern Parkway	...	...	10	...	...
	Livania Ave.	...	...	32	...	...
		
Mo. P.....	Cochrane, Kan.	Pass. track	...	...	2	...	1 Approach and detector locking, three electric signals.
	Nearman, Kan.	Pass. track	...	...	4	...	2 Approach and detector locking, six electric signals.
	Walcott, Kan.	Pass. track	...	...	4	...	2 Approach and detector locking, six electric signals.
	Stilwell, Kan.	Pass. track	2	...	...	...	2 Approach and detector locking, six electric signals.
N. Y. C.....	Wagstaff, Kan.	Pass. track	1	...	...	...	1 Approach and detector locking, three electric signals.
	Manitou, N. Y.	Crossover	20	...	...	...	Rebuilt. No levers added. Approach and route locking. Elec. signals.
Lines East.....	Long Island, N. Y.	Crossover	24	...	...	...	Rebuilt. No levers added. Approach and route locking. Elec. signals.
I.H.B.....	Calumet Park, Ill.	Crossing	...	...	...	...	Rearrangement of handle add. track. Detector locking installed.
N. Y. C. & St. L.....	Madison, O.	Crossing	8	...	...	...	Two lap sidings.
	Green Springs, O.	Crossing	...	...	24	6	1 Lap sidings.
	Ashtabula, O.	Crossing	8	...	...	...	Lap sidings.

Name of road	Location	Layout— crossing, junction terminal, etc.,	Working levers			Electric switch movements on outlying switches		Remarks on Special Features Approach, route, detector locking, electric signals at mechanical plants. State if all now work, or if plant rebuilt, number of levers added
			Me- chanical	Elec- tric	Electro- Pneu- matic	Electro- mechanical Mech.	Elec.	
N. P.	Anglim, Minn.	Crossing	13	...	...	...	...	Power dist. sigs. Approach locking.
	Buffington, Minn.	Crossing	13	...	...	...	...	Cabin. Power sigs. Approach locking on one road and detector locking on other.
	Moorehead, Minn.	Crossing	...	...	...	...	...	Added, power sigs. and approach locking.
	Fargo, N. D.	Crossing	...	...	...	...	...	Added, power sigs. and approach locking.
	Casselton, N. D.	Crossing and jct.	...	...	...	...	...	Added, power sigs. and approach locking.
Penna. System	Highlandtown, Md.	Crossing	...	...	...	8	14	Approach and detector locking.
Eastern Region	Tyrone, Pa.	Outlying	...	...	...	12	7	Approach and detector locking.
	Delaware Jct., Del.	Crossing	...	...	...	5	9	Approach and detector locking.
	So. Elizabeth, N. J.	Outlying	...	...	...	...	...	1* No added levers. Low pressure el. pneu. switches substituted for high pressure or mech. switches. *Substituted.
	Schuylkill Haven, Pa.	Outlying	...	...	...	...	1	1* Consolidation of two plants. Abandoned 6 mech. levers, added 1 elec. *Sub. for mech.
	Leesport, Pa.	Crossing	...	...	...	...	2	1* Consolidation of two plants. Abandoned 5 mech. levers, added 2 elec. *Sub. for mech.
	Rockville, Pa.	Junction	...	...	...	...	8	5* Substituted crossovers for slips and M. P. F. Substituted 9 el. mech. for mech. *Sub. for mech.
Central Region	"J.B." Carnegie, Pa.	Junction	...	...	...	54	12	Twelve S-8 electric units added to existing ma- chine.
	"D.V." Temperance- ville	Outlying	...	...	...	52	11	Eleven S-8 electric units added to existing ma- chine.
	"W. G." Sturgeon, Pa.	Outlying	...	...	...	32	7	Seven S-8 electric units added to existing ma- chine.
	Aspinwall, Pa.	Layout	...	...	40	...	...	Complete approach and route locking.
P. & R.	Harrisburg, Pa.	Junction	...	...	32	...	...	Approach, route and detector locking.
A. C. R.	Atlantic City, N. J.	Draw	...	20	...	...	...	Approach, route and detector locking.
Southern:	Ludlow, Ky., to Cin.	Jct. and bridge..	...	22	...	...	...	Approach, route and detector locking, 12-lever mech. mach. and 10-lever elec. consolidated to 22.
	C. N. O. & T. P. cinnati, O.	...	...	...	...	...	...	...
Total			125	190	158	233	90	19
CANADA								
Can. Nat'l.	Regina, Sask.	Crossing	...	...	...	...	...	Auto. elec. control of derrails on street railway by trolley contactors. Approach and route lock- ing.
C. P.	No. Edmonton, Alta.	Crossing-jct.	32	...	...	...	...	Approach locking. Elec. distant signals.
	Moncton, N. B.	Junction	18	...	...	...	...	Approach and detector locking.
Total			50	...	...	...	...	...

held back to a certain extent by the prices of signal materials. As expressed by one road, "We are badly handicapped in putting through any requests of this character (signal construction budgets) due to the fact that the price of signal material has been held practically up to the war level and railroad managers are very naturally reluctant to purchase this class of material until prices reach the level of other railroad material. Less than 50 per cent of the needed work will probably be done, on this account." On the other hand, manufacturers have found it necessary to meet increased prices of raw material such as pig iron, which has gone from about \$22 to \$30 a ton, while labor charges have increased approximately 10 to 20 per cent. The average prices of materials in 1922 were about the same as in 1921. Comparing the prices now with those prevailing in 1913-14 they average around 50 per cent higher for similar materials.

Developments in the Signal Field

The big development during the past year has been in connection with automatic train control, as the order of the Interstate Commerce Commission issued on June 13, 1922, requiring 49 railroads to make installations, has necessarily stimulated activity in this field. Some feel that this order will stimulate the installation of automatic block signals and other safety devices rather than retard such work, and that it will result in a greater recognition of the importance of signal work by operating officers.

Another outstanding feature of the past year is the increasing recognition given to the important relation which signaling bears to the more efficient operation of trains. Highway crossing protection is another subject which has assumed major importance. Other developments of note were the increased use of light signals and of the trickle charge

for the operation of signal and highway crossing apparatus, while greater use is being made of approach and continuous burning electric lights for signals in replacing oil lamps. The use of remotely operated outlying electric switch movements has increased as evidence has multiplied of the economies effected by such installations; and attention has been given to the electrical operation of switches in classification yards. The value of more efficient track bonding is being generally recognized. At mechanical plants many mechanical detector bars have been eliminated and electric detector locking substituted. The regular engineering development work, with standardization of materials and improvement of existing apparatus, has been carried on.

Next year's developments in signaling will be along the above lines. The major subjects will be automatic train control, intensive study of signal economies, the more extensive operation of trains by signal indication, automatic signaling of single track lines, highway crossing protection, distant operation of outlying switches and the study of more efficient yard layouts as affected by signaling.

Budgets Approved

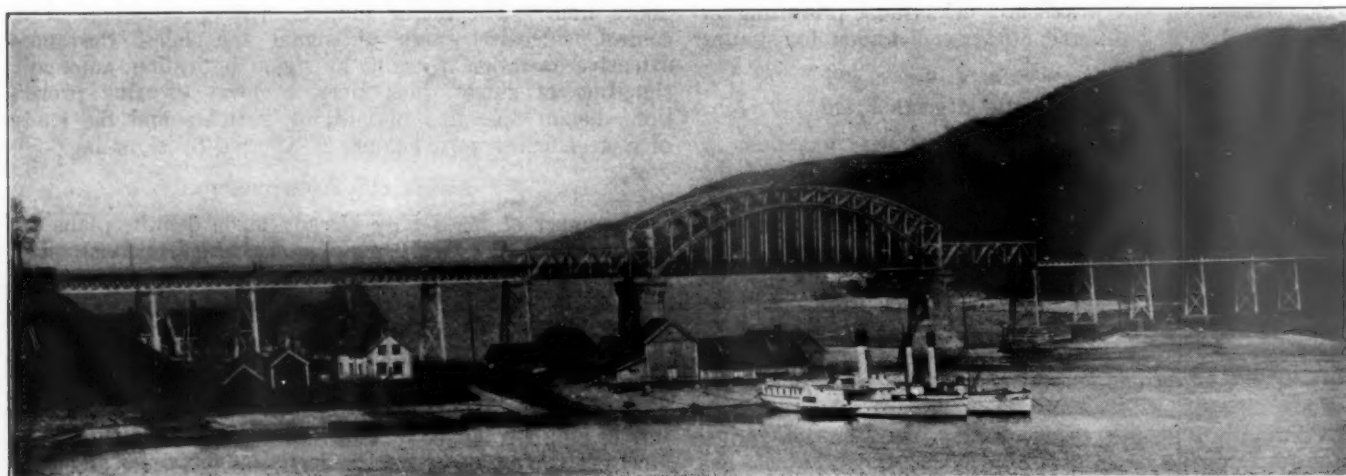
A number of roads have already made definite plans for the installation of signals and interlockings in 1923. The Ann Arbor expects to spend approximately \$135,000 for such equipment, while the Chicago, Rock Island & Pacific has \$230,000 listed for block signals, interlockings and train control. The Great Northern has authorized the installation of 345 miles of automatic signals at an approximate cost of \$777,000 and an item of \$210,326 is listed for signals and interlocking by the New York, Chicago & St. Louis. The Norfolk & Western expects to spend \$300,000 for signaling during 1923 and the Pere Marquette has \$150,000 listed for signals and interlocking.

Interlocking Plants Contemplated for 1923

Name of road	Location	Layout—Crossing, junction, terminal, etc.	Working levers				Electric switch movements on outlying switches	Remarks on Special Features
			Mechanical	Electric	Pneumatic	Electro-mechanical		
						Mech.	Elec.	
Ann Arbor.....	Toledo, O., Manhattan	Crossing	...	...	...	...	...	Details not determined.
A. C. L.....	Ridgeland, S. C.	End. bb. track	...	...	...	4	2	Approach, route and detector locking.
	Hardeeville, S. C.	Junction	...	...	...	8	8	Approach, route and detector locking.
	Chatham, Ga.	End double track	...	...	...	4	7	Approach, route and detector locking.
	Ashley R. Drayton, S. C.	Draw & S. end. double track	...	...	...	6	4	Approach, route and detector locking.
	Central Jct., Ga.	Junction	59	...	...	...	...	Rebuilt, 4 elec. sigs. added.
	Telfair Jct., Ga.	Junction	12	...	...	...	...	Rebuilt, 2 electric slotted sigs. added.
	North Tower, Ga.	Junction	...	...	...	15	8	Detector locking.
	Burroughs, Ga.	Crossing	...	...	...	13	2	Approach, route and detector locking.
	Doctorton, Ga.	Draw	...	...	...	5	10	Approach, route and detector locking.
A., T. & S. F.....	Eldorado, Kan.	Crossover, jet.	...	25	...	...	...	Approach and detector locking.
C. & O.....	McDougal, W. Va.	Crossover	...	...	...	3	2	Electro-mech. U. S. & S., Type S-8.
	Lynchburg, Va.	Crossing	...	...	...	13	4	Electro-mech.
	Ashland, Ky.	Turncut	15	2	...	...	...	2, add. Elec. levers for sigs. and switch machines.
D. & H.....	Oneonta, N. Y.	Yard	...	38	...	...	...	Change from 21-lever mechanical. Approach, route and detector locking.
I. R. T. Co.....	240th Street, White Plains Rd.	Yard	...	...	52	...	...
	Jerome Ave.	Yard	...	...	50	...	...
N. Y. C. & St. L.....	Blasdell, N. Y.	Crossing	...	...	...	...	...	Electro-mech. plant. Details not decided.
	Dunkirk, N. Y.	Crossing	...	...	...	...	...	Electro-mech. plant. Details not decided.
	Maple Grove, O.	Crossing	...	...	...	...	...	Electro-mech. plant. Details not decided.
	Latty, O.	Crossing	...	...	...	...	...	Plant to be rebuilt and extended.
	Mortimer, O.	Crossing	...	...	...	...	...	Plant to be rebuilt and extended.
N. Y. C. Lines West Dock Jct., Pa.		Junction	68	...	...	...	...	Plant to be rebuilt, 32 levers added. Approach, route and detector locking. Electric signals.
Indiana Harbor Belt, Wolf Lake, Ind.		Crossing	...	...	...	...	8	Rearrangement. Eight levers added. Detector locking to be installed.
P. & R.....	Schuylkill Haven, Pa.	Crossing	35	...	...	...	...	Approach, route and detector locking.
Atlantic City R.R.	Camden, N. J.	Terminal	...	...	...	...	...	Details not decided.
Southern	Calverton, Va.	Junction	23	...	...	...	...	Detector locking to replace bars.
	Orange, Va.	Crossing	24	...	...	...	...	Detector locking to replace bars.
	Pomona, Va.	Crossing	29	...	...	...	...	Detector locking to replace bars.
	New Line, Va.	Crossing	20	...	...	...	...	Detector locking to replace bars.
St. L. S. W.....	East Waco, Tex.	Crossing	...	...	...	...	...	Additional functions to protect movements over Brazos Bridge, H. & T. C., and I. G. N. details not fixed.
U. P.:								
L. A. & S. L.....	Fullerton, Calif.	Crossing	...	12	...	...	...
Wabash	Detroit, Mich.	Crossing	...	24	...	...	...	Rebuilt and functions to be added.
Total			285	101	102	71	55	4

CANADA

Can. Nat'l:								
Can. Nor.....	St. Augustine, Que.	Crossing	13	...	...	...	...	Two electric distant signals.
	Aldred Jct., Que.	Junction	2	...	...	...	...	Two electric signals.
	Harrowsmith, Ont.	Crossing	24	...	...	...	...	Electric distant signals.
	Hurdman, Ont.	Crossing	8	...	...	...	...
	Lachute, Que.	Crossing	13	...	...	...	...	To be rebuilt.
	Montfort Jct., Que.	Crossing	13	...	...	...	...	To be rebuilt.
	St. Cloud, Ont.	Crossing	13	...	...	...	...	To be rebuilt.
	Trenton, Ont.	Gates	4	...	...	...	...	To be rebuilt and 2 gates added.
Total			90	...	...	...	...



Minne Bridge, Norway

Railroad Telegraph and Telephone Work

Additional Telephone Facilities and Pole Line Reconstruction Receive First Attention

By J. H. Dunn



INCREASED activities in renewing pole lines, replacing iron wire with copper, and extending telephone facilities for both train dispatching and message circuits are evidenced by reports from many roads. Recent developments of radio and carrier current telephony equipment also make these forms of communication available as an aid in meeting the increased demands for railroad communication. One hundred and forty-seven leading railroads representing about 86 per cent of the mileage of the United States and Canada have furnished information for this our third annual review of the railroad telegraph and telephone activities.

Work Completed in 1922

New work was completed in 1922 on 38 of the 147 roads reporting, as shown in Table 1. Approximately 174 miles of new pole line is reported as having been built during the year. This does not, however, cover the extensive renewal of pole lines that has been in progress on many roads. The increased use of copper line wire is evidenced by the installation of 7,544.4 miles of this material as compared with only 659 miles of iron wire. The Canadian National alone used 2,803 miles of copper and the Chicago, Burlington & Quincy installed 1,543 miles. In 1921 the Canadian roads used about 3,000 miles of copper.

Telephone train dispatching was installed on 3,978 miles of road in 1922 as compared with 1,233 miles in 1921. In fact, the Canadian National alone installed 941 miles in 1922, while the Atchison, Topeka & Santa Fe installed 563 miles.

Over 1,826 miles of metallic conversation and message circuits were installed in 1922, an increase of more than 137 miles over 1921. The Chicago, Burlington & Quincy led in this class of installation with 621 miles and the New York Central was second with 235 miles, while the Baltimore & Ohio installed 187 miles. The increased use of telephone circuits in yards is shown by the installation of 149 miles, which, although not a large figure, represents several extensive yard layouts and circuits.

The increased utilization of existing wires is evidenced by the installation of 3,356 miles of simplex circuits, 1,848 miles of composite circuits and 756 miles of phantom. The installation of 241 telephone booths shows that the railroads more fully appreciate the value of telephone communication at outlying passing switches, industry spurs and crossovers.

It is of special interest to note that one of the first extensive railroad-owned cables for telegraph and telephone service was installed during 1922, by the New York, New Haven & Hartford between New Haven, Conn., and Woodlawn, N. Y., at a cost of approximately \$1,302,700. This

54-pair paper insulated cable, 72 miles long, including the Harlem River branch, is stormproof. It is part aerial and part underground with steel-armored submarine cables at all rivers.

Work Under Construction

Telegraph and telephone construction planned for 1922 was largely completed by the end of the year, as is shown by Table II. Of 23 roads listed as having work now under construction the Atlantic Coast Line has the largest job unfinished—234 miles of road, using 1,068 miles of copper on a metallic telephone dispatching circuit. The Los Angeles & Salt Lake is also working on a telephone circuit using 934 miles of copper wire, while the New York Central and the Canadian Pacific have a few hundred miles of telephone circuits under construction. The total of this class of work on the 23 roads reporting work under way amounts to 354 miles of telephone train dispatching and 858 miles of conversation or message circuits. Ten roads report work in progress on superimposing circuits. The Pennsylvania is working on a simplex circuit 264 miles long, while the Atlantic Coast Line has one of 234 miles. A composite circuit of 480 miles on the New York Central is the only one of this type reported under construction. A total of 893 miles of phantom circuits is included in the list, the largest being 366 miles on the Atlantic Coast Line and the second largest, 249 miles, on the New York Central Lines East. A total of 34 miles of overhead and 14 miles of underground cable is now under construction.

Bright Prospects for 1923

In spite of the fact that these data were of necessity furnished in some cases before estimates for the budgets were completed it is interesting to note in Table III, that 26 roads have definite plans for work contemplated for 1923. In fact, final approvals have actually been granted for many of these projects. The Northern Pacific contemplates installing 1,475 miles of copper line wire and the New York, New Haven & Hartford 1,400 miles. The Great Northern is next with 1,012 miles and the Union Pacific plans to install 934 miles. Several other roads list large orders, making a total of 11,179 miles of copper wire, which is 2,880 more miles than was contemplated at the beginning of 1922. No road proposes to install any telegraph dispatching circuits, whereas at least 1,355 miles of telephone dispatching is assured. Further increase in the popularity of telephone circuits is shown by the contemplation of 3,885 miles of metallic conversation and message telephone circuits as compared with 2,798 miles of the same class of work proposed for 1922. Prospects for

communication to sidings is evidenced by the proposed installation of 291 telephone booths.

Some roads report prospects of a shortage of trained men for construction work. Skilled linemen are needed by two roads and a lack of men to develop into wire chiefs is evidenced on several others. A scarcity of satisfactory Morse operators is reported and it is well known that few young men are training for this vocation.

General Outlook Encouraging

The demand for the betterment and extension of railroad communication facilities is evidenced on every hand. At the convention of the Telegraph and Telephone Section, A. R. A., held the second week in December, it was readily apparent that the majority of members present were seriously seeking information on recent developments with which to meet the increased demands on present facilities and the best means of supplementing the existing plants. On request from the *Railway Age*, personal letters were received from 31 superintendents of telegraph giving a brief outline of the prospects for 1923. Twenty of this number stated that the outlook for the construction of telegraph and telephone facilities was brighter than it has been for several years. Following a few years of continued economy, the reports show that the reconstruction of pole lines is, of course, an important matter. On a few of the roads definite needs of pole lines aggregate over 1,000 miles.

The tendency in renewing poles is to use wood poles treated with preservatives. The kind of wood used depends on the locality and markets but the majority favor butt treatment, although a few advocate treating the poles in the entirety.

The treatment of cross-arms is not thought by most roads to be necessary. One road has about a mile of concrete poles, the maintenance and life of which are being watched with interest. New wire for replacing old iron wire with copper and for new circuits is needed to the extent of nearly 27,000 miles, according to reliable data. Only one road stated that the present communication facilities were adequate to meet the needs; while one other said "we can get along."

This program of "getting along" has evidently been carried too far, for 14 of the 31 roads consider that telephone circuits for train dispatching and conversation are to be given preference over everything else, including even pole line reconstruction. The Interstate Commerce Commission's statistics of January 1, 1922, show that the telegraph is used for the dispatching of trains on 132,682 miles of road while the telephone is used on 123,252 miles of road. Of the 246,414 miles of road operated the telegraph is employed on 53.8 per cent and the telephone on 50.02 per cent, the apparent discrepancy being due to an overlap of telegraph and telephone on certain roads. The information in Table I shows that nearly 4,000 miles of road was equipped with telephone train dispatching in 1922, which brings the telephone train dispatching up to 51.6 per cent.

It is not to be considered that the telephone is to replace the telegraph entirely. In fact, a combination is of an advantage in numerous cases. The telegraph is considered by many as better adapted for long reports and messages between terminals and with the use of printers the telegraph will, no doubt, continue to hold this field for years to come. The possibilities of superimposing telegraph circuits on telephone circuits increases the usefulness of the line wires and

TABLE I—TELEGRAPH AND TELEPHONE WORK COMPLETED IN 1922

Name of road	Total miles of pole line owned exclusively by railroad			Pole line owned jointly by R. R. and telegraph company		Total miles of wire owned by railroad, includes 1/2 of joint wires				Circuit miles of telephone circuits railroad owned					
	Signal and electrical			and telegraph company		Telegraph and telephone				Circuit miles of telephone circuits railroad owned					
	Telegraph	Transmission	Service	Miles	Miles used jointly by signal department	Iron	Copper	Transmission	Service	Road miles dispatched by telegraph	Road miles dispatched by telephone	Metallic dispatching	Metallic block	Metallic conversation or message	Yard circuits, all kinds
A. T. & S. F.	10	.....	36.5	1,054	.....	.....	15	553	565	.....	55	.....
B. & O.	164	.....	187	35
B. & L. E.	1
Can. Natl.	255	2,803	.....	.....	.....	941	1,882	.....	.....	.....
C. & N. Y.	144	140	.....	115	11
C. & P.	1	.....	.....	.....	.....	4	36	.....	.....	.....	197	2	.....	34	.....
C. & W.	7.5	8	.....	.....	.....	.....	.....	.....
C. & M. & St. P.
C. & B. & O.	100	1,543	78	780	349	349	349	50	621	.....
C. & N.	137	302	.....	.....	.....	.....	.....	.....	.....	.....
G. & T.	334	.....	.....	160	.....
L. & N.	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	10	10	.....	.....	.....
L. & H. R.	335	.....	.....	.....	73.3	86	.....	.....	.....
L. & V.	5	.....	.....	.....	.....	.....	33	.....	23	.....	.....	4	6	.....	.....
L. & I.	57	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
M. K. & T.	3.75	9.6	.....	.....	.....	24	283	4.5	33.6	.....	.....	.....	24	.....
Mo. P.	697	482	6	.....	110	6
M. St. P. & S. S. M.	65	.....	.....	.....	.....	.....	.....	.....	.....
N. Y. & N. H. & H.
N. Y. C. Lines:
N. Y. C.	223	.....	.....	.....	.....	.....	.....	235	20
I. H. B.	22	.....	.....	.....	.....	11	.....	.....	.....
M. C.	0.25	0.75	.....	.....	.....	5.4	0.75	2.3	.....	.....	.....	.....	.....	27
T. & O. C.	600	.....	.....	.....	5.5	167	.....	167	.....
N. & W.	155	514	.....	1
N. Y. C. & St. L.	5.4	.....	.....	.....	17.7	.....	.....	.....	.....	.....	.....
P. & R.	16.6	.....	.....	.....	.....	16.6	.....	.....	.....	.....	249	498	.....	111	13
P. & S.	42	.....	.....	.....	.....	.....	.....	.....	.....
Penna. System:
Eastern Region	60	.....	.....	.....	.....	.....	.....	.....	.....	9	9	.....	.....	.....
Central Region	0.8	.....	36	.....	.....	.....	.....	.....	3.7	3	21
S. W. Region	28	.....	.....	.....	.....	.....	1	.....	14
N. W. Region	3.2	.....	2.7	.....	.....	.....	.....	3.2	.....
Southern	1.6	.....
S. P.	426	.....	.....	.....	17
U. P.	29.5	.....	29.5	.....	.....	.....	29.5	.....	.....	.....	.....	.....
O. S. L.	8.7	.....	8.7	.....	.....	.....	.....	180	180	.....	.....	.....
O. W. R. & N.	58	360	.....	.....	.....	15	15	.....	.....	.....
Virginian	15	.....	.....	.....	.....	.....	30	.....	.....	.....	.....	.....	.....	.....	.....
W. P.	27.4	.....	13.7	.....	.....	.....	33	.....	.....	.....	.....	.....
Totals	42.6	121	10.35	75.6	6.2	659	7,544.6	373.75	867.3	425.5	3,977.8	4,243	574.7	1,826.8	166

							Miles of cable in line exclusive of drops to offices and signals, etc.							
Name of road	Total miles of superimposed circuits			Telegraph circuits			Telegraph offices	Telephone offices	Telegraph service		Signal and electrical			
	Simplex	Composite	Phantom	No. duplex	No. quad	No printer	Division or terminal	Way station	Telephone block	Telephone booth	Overhead	Underground	Overhead	Underground
A. T. & S. F.	1,236				1									
B. & O.														
B. & L. E.														
Can. Natl.	252							9						
C. R. R. N. J.			124						51	27	1.5	0.5		
C. R. I. & P.	34													
C. G. W.	197			1			1	6		21				
& W. I.													0.2	1.7
C. M. & St. P.			9.3											
C. B. & Q.	400	1,242		4						25			9	
C. & O.	149													
G. N.														
G. T. & N.										5	0.8			
L. & H. R.			39						15	43				
L. V.														
M. K. & T.														0.5
Mo. P.										16				
M. St. P. & S. S. M.	509			2	2	2	2	147	4	3				
N. Y. C.	114									2.5	0.5			
N. Y., N. H. & H.										72				
N. Y. C. Lines:														
N. Y. C.		577	241					10		10				
I. H. B.														
M. C.								2	2	5	5	0.75		0.6
T. & O. C.	250													
N. & W.								2						
N. Y. C. & St. L.										12				
P. & R.	167		72						89	21	0.3	1.3		
P. & S.														
Penna. System:														
Eastern Region											2			
Central Region	30		271					3	14	30	1.5			
S. W. Region											0.2		0.2	
N. W. Region	200													
Southern	17.8													
S. P.														
U. P.		29.5					1	4				3.7		
O. S. L.														
O. W. R. & N.								7	18	26				
Virginian														
W. P.														
Totals	3,555.8	1,848.5	756.3	7	3	2	4	198	193	241	88.8	6.75	9.4	2.8

poles and renders this service as a by-product. Increased activities and studies in this direction are evident in many places.

Practical Developments

The telephone for train dispatching and long distance conversation, the line circuits being superimposed with telegraph

circuits for Morse telegraph and the operation of printers, has now become a well established development.

In view of the rapidly decreasing supply of wooden poles extensive efforts are being made to produce the best possible preservatives. As substitutes for wooden poles, steel poles and concrete poles are being developed with the view of producing them cheaply enough to permit of extensive use.

TABLE II—TELEGRAPH AND TELEPHONE WORK UNDER CONSTRUCTION, JANUARY 1, 1923

[illegible]

Cent. Region	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
S. W. Region	.....	.....	.....	.....	.....	196	.....	.....	.....	.....	.....	.....	197	.....	.....
N. W. Region	.....	.....	.....	.....	.....	40	.....	.....	.....	.....	.....	.....	48	.....	.....
U. P.	.....	.....	.....	.....	11	5.8	.....	.....	.....	.....	11.6	11.6	.....	.....	.....
L. A. & S. L.	.....	.....	.....	.....	.....	934	.....	.....	.....	.....	.....	.....	.....	.....	.....
Totals	.....	.....	11	12.25	65	85.8	2,690	175	117.7	148	245.6	353.6	197	858	6.1

Miles of cable in line
exclusive of drops
to offices and signals, etc.

Total miles of
superimposed circuits

Telegraph
circuits

Telegraph
offices

Telephone
offices

Telegraph
service

Signal
and electrical

Name of road	Simplex	Composite	Phantom	No. duplex	No. printer	Division or terminal	Way station	Telephone block	Telephone booth	Overhead	Underground	Overhead	Underground
A. C. L.	234	.....	366	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
A. T. & S. F.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
C. B. & O.	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1	.....	.....
C. & W. I.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.5
Ill. Tract.	.....	.....	75	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
L. & N.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.24	.....	.....	.....
L. V.	.....	.....	39	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
M. K. & T.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.5	.....
Mo. P.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
N. P.	.....	.....	93	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
N. Y. C.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
L. East.	.....	480	249	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
L. West.	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	5	.....	.....
C. C. C. & St. L.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....
B. & A.	.....	.....	44	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
M. C.	.....	.....	.....	.....	.....	.....	1	.....	.....	1.5	.....	.....	.....
N. & W.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
N. Y. C. & St. L.	.....	.....	.....	.....	.....	.....	.....	.....	10	.....	.....	.....	.....
N. Y. N. H. & H.	.....	.....	27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
P. & R.	54	.....	.....	.....	.....	.....	.....	28	5	.....	.....	.....	.....
Penn.:	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
East Region	.....	.....	.....	.....	.....	.....	.....	.....	.....	12	.....	16	.....
Cent. Region	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
S. W. Region	264	.....	.....	1	.....	.....	1	57	.....	.7	.13	.....	.....
N. W. Region	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
U. P.	1	.....	.....	.....	1	1	1	.....	2	.....	5.4	.....	.....
L. A. & S. L.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Totals	553	480	893	1	1	1	3	87	17	17.44	12.5	16.5	1.5

Reception on passenger trains of radio programs is considered by several leaders in the field as more of a passing novelty and not warranting extensive application or expense. In order to be pleasing as an entertainment the reception must be perfect, with little variation; and this, of course, is difficult to secure with a limited aerial and the varying ground connection of the wheels and rails.

The practical field of radio and "wired wireless" on railroads evidently lies in the communication between the head end and rear of long freight trains; to and from moving trains by the dispatcher, and for long distance communication between division headquarters. For the last mentioned service, present developments are already applicable. Apparatus

for communication between the head and rear end of trains is now being developed by several large manufacturers who have reported excellent progress. The results to be expected of "wire carrier" radio systems is assured by the installations now in service by commercial companies; the development of apparatus to meet railroad requirements depends on demand and on manufacturing details.

In conclusion it may be said that the "state of the art"—the development of telephone and telegraph facilities—is far ahead of what is to be found in actuality on the majority of railroads. Alert railroad managements are seeing this lack and as a result rapid growth in the field is to be expected in the future.

TABLE III—TELEGRAPH AND TELEPHONE WORK PROPOSED FOR 1923

Name of road	Total miles of pole line owned exclusively by railroad, telegraph	Pole line owned jointly by R. R. and telegraph company, miles	Total miles of wire owned by railroad. Includes 1/2 of joint wires telegraph and telephone		Road miles dispatched by telegraph	Road miles dispatched by telephone	Circuit miles of telephone circuits railroad owned				
			Iron	Copper			Metallic dispatching	Metallic block	Metallic conversation or message	Yard circuits, all kinds	Grounded dispatching
A. T. & S. F.	30	784	.....	.....	.....	.....	.....	.....	.....
C. P.	50	.....	.....	890	.....	.....	.....	.....	.....	.....	.....
C. R. I. & P.
C. & W. I.	75	.....	.....	.....	.....
D. & H.	61	35	.....	.....	.....	.....
G. N.	1,012	.....	.....	.....	.....	.....	506	.....
G. T.
West Lines	325	.....	.....
I. C.	229	.....	.....	114	.....	.....	.....	.....
K. C. S.	129	.....	.....	.....	.....	.....	.....	.....
L. & N.	1,639	.....	819
M. K. & T.	200	.....	.....
N. P.	1,475	.....	.....	.....	.....	.....	.....	.....
N. Y. C.
Lines East	52	141	.....	.....	.....	378	193	.....	.....
Lines West	150	3	.....	.....
B. & A.
C. C. C. & St. L.	440	.....	70	140	.....	300	.....	.....

Name of road	Total miles of pole line owned exclusively by railroad, telegraph	Pole line owned jointly by R. R. and telegraph company, miles	Total miles of wire owned by railroad. Includes 1/2 of joint wires telegraph and telephone		Road miles dispatched by telegraph	Road miles dispatched by telephone	Circuit miles of telephone circuits railroad owned				
			Iron	Copper			Metallic dispatching	Metallic block	Metallic conversation or message	Yard circuits, all kinds	Grounded dispatching
M. C.				692			35		305	6	
I. H. B.				231					116		
N. Y. N. H. & H.	11			1,400		163	163		537		
P. & R.				303		152	304				
U. P.			200	934		467	467				
O. S. L.							674				
O. W. R. & N.			28	717			91		267		
L. A. & S. L.				784			934				
Virginian	4			8		4					
W. P.				1,010		438	1,010				
Wabash							309				
Totals	65		310	11,179		1,355	4,672	528	3,885	512	819

Name of road	Total miles of superimposed circuits			Telegraph circuits		Telephone offices		Miles of cable in line exclusive of drops to offices and signals, etc.		
	Simplex	Composite	Phantom	No. duplex	No. quad	Telephone block	Telephone booth	Overhead	Underground	Signal and electrical, overhead
A. T. & S. F.										
C. P.									4	
C. R. I. & P.	75									
C. & O.										
D. & H.										
G. N.										
G. T.										
West* Lines	325									
I. C.										
K. C. S.	129									
L. & N.	30							3.5		
M. K. & T.			200							
N. P.	920									
N. Y. C.										
Lines East	378		28							
Lines West								5	1	
B. & A.			106							
C. C. C. & St. L.									1	
M. C.	340		210	2				2.75	2	
I. H. B.										
N. Y. N. H. & H.			260					8	2	
P. & R.	152					93	63	1.1		
U. P.	467			1			77		1.7	6.2
O. S. L.							20			
O. W. R. & N.										
L. A. & S. L.	1			1			100			
Virginian										
W. P.				927			31			
Wabash										
Totals	2,817		804	931	2	93	291	20.35	11.7	6.2

An Analysis of the Railway Statistics for 1922

(Continued from page 115)

—freight traffic for the whole of 1923 should be greater than in 1922, and will be more evenly distributed throughout the year. That there will be another nation-wide railway strike in 1923 seems unlikely; labor's experience with that method of gaining their ends in 1922 should make them wary of renewed attempts in the near future.

Barring unforeseen disturbances, therefore, freight traffic should be heavy in 1923. Passenger traffic seems to be in a decline, from which it will recover with difficulty; there is a minimum limit, however, and we should nearly have reached it in the business of 1922. The mail and express business should continue heavy. Operating revenues as a whole should therefore be greater than in 1922. This does not take into account possible further reductions in rates. Nor does it make allowance for financial or political developments abroad, such as might have an untoward effect on American industrial conditions. For the long pull, the United States cannot hope to attain any measure of con-

tinued prosperity until Europe begins to rise out of her slough of despond. That we can attain a fairly prosperous level in 1923, however, seems a reasonable expectation.

Railway revenues, then, should increase in 1923. Operating expenses may also show some increase, as prices are now stiffening. On the other hand, the railways are holding a tight rein on their expenditures, and they will hardly be confronted in 1923 with the cost of a strike that in 1922 ran their expenses up and temporarily demoralized their forces.

If revenues increase, and expenses are no greater, the net will show improvement. The rate of return may well approach five per cent in 1923. As a matter of justice and equity, it should be far greater, for the railways have too long subsisted on a lean bill of fare. They earned 3.3 per cent in 1921 and 4.05 per cent in 1922; it is time they crossed the five per cent line and began to see the goal of at least a "fair return" ahead of them.

B. H. Meyer Elected Chairman of I. C. C.

WASHINGTON, D. C.

PURSUANT to the policy adopted on January 13, 1911, that the term of office of the chairman of the Interstate Commerce Commission shall be filled from year to year in the order of seniority, the commission announced on December 29 that Balthasar H. Meyer had been unanimously elected chairman to serve from January 1, 1923, for the ensuing year. He succeeds Commissioner Charles C. McChord, who has served since October 3, 1921, following the resignation of Chairman Edgar E. Clark. This will be Commissioner Meyer's second term as chairman of the commission, as he served in that capacity in accordance with the seniority rule for a year beginning in March, 1916. He has been a member of the Interstate Commerce Commission since January, 1911, having been appointed by President Taft. Previous to his appointment to the Federal commission, he had gained a high reputation as an economist and had had five years of practical experience in the regulation of railroads as a member of the Railroad Commission of Wisconsin and he had been a professor of political economy in the University of Wisconsin since 1900.

In accordance with the commission's plan of organization, by which its membership is divided into divisions, each in charge of a particular phase of the commission's work, Mr. Meyer has been chairman of Division 4, which also includes Commissioners Eastman and Potter, which is in particular charge of the commission's activities relating to financial matters such as the regulation of security issues, the administration of the loan fund, the issuing of certificates of public convenience and necessity, authorizing the construction or abandonment of a line, and the authorization of control of one carrier by another. He had previously been in charge of that department of the commission's work which deals with accounting and in that connection had much to do with the development of the uniform system of accounts in co-operation with the accounting officers' association. He was also a member of the Railroad Securities Commission, of which President Hadley of Yale University was chairman, which was appointed by President Taft to investigate the question of the issuance of railroad securities. While a member of the Wisconsin commission, Mr. Meyer was greatly interested in the development of a cost accounting system and in the idea of making more extensive use of cost data in the fixing of rates, and he has also shown leanings in that direction in connection with his work on the Interstate Commerce Commission, although such matters have been held rather in abeyance during recent years because of the pressure on the commission for activity in other

directions as a result of federal control and the new functions imposed upon the commission by the Transportation Act.

Balthasar Henry Meyer was born in Mequon, Ozaukee County, Wis., on May 28, 1866. He taught district school in the winters of 1884-86 and became principal of the schools in Fredonia, Wis., in 1887. In 1889 he was made principal of the high school in Port Washington, Wis. He was graduated from Oshkosh Normal School in 1893 and received the degree of B.L. from the University of Wisconsin in 1893, and of Ph.D. in 1897. He attended graduate courses at the University of Berlin during 1894-5. In 1896 he was appointed extension lecturer for the University of Wisconsin, and was made assistant professor of sociology in 1899. He was elected professor of political economy in 1900 and was granted leave of absence from the university in 1905 to become a member of the Railroad Commission of Wisconsin. He was chairman of the commission from 1907 to 1911, when he was appointed to the Interstate Commerce Commission. He is the author of "Railway Regulation in the United States," published in 1903, and has written a number of articles on economic subjects.



B. H. Meyer

Reports of Excess Earnings

WASHINGTON, D. C.

HOW THE ENFORCEMENT of the recapture provisions of the Transportation Act is being both delayed and complicated by the fact that the Commission's valuations have not yet been completed, is strikingly illustrated in a report submitted by the Commission to the Senate on December 30, in response to the Capper resolution calling for information regarding the progress made in the recapture of earnings. The information which the Com-

mission said it was prepared to furnish at this time was that three Class I railroads have reported excess earnings, while the tentative valuations served by the Commission indicate that 13 other Class I railroads had excess earnings for that part of 1920 during which the roads were not under guaranty and for 1921, but no Class I railroad has paid any excess earnings to the Commission. Twenty-six other than Class I railroads reported excess earnings and nine have paid to the Commission approximately \$42,000 as representing half of the excess.

All Class I carriers have made reports to the Commission in response to its orders as to their excess earnings, although many have done so under protest, some on the ground that the recapture provisions of the law are unconstitutional and many on the ground that the value on which the 6 per cent return is to be calculated has not yet been determined. Other roads have taken the position that the return indicated by their accounts is still tentative.

The Commission says it is not at this time in position

to report the value of the railway property of all carriers for which information is desired and it takes occasion to point out that its work in this direction will be expedited if Congress will allow it sufficient appropriations for the purpose. No valuations under paragraph 6 of section 15-a have been made, the report says, while the tentative valuations date back from four to eight years and have not as yet been brought up to the periods affected by the statute. This will involve considerable accounting and engineering work in connection with the checking up of additions and retirements.

The limited appropriations for valuation have during the last two years forced the Commission to choose between the curtailment of its activities in fixing and issuing tentative valuations as of specific dates of valuation or deferring the work of bringing valuations up to date. It adopted the latter alternative, but the bringing of valuations up to date is receiving active attention and men are now engaged in the field and in the Washington offices in bringing up to date the valuations of some 40 carriers whose returns indicate that their earnings may be subject to the recapture provisions of section 15-a. Apparently this means that on the basis of the tentative valuations the roads had excess earnings for 1920 and 1921, although on the basis of the carriers' claims as to their value, which the Commission gives in response to the request of the resolution for the nearest approximation to the value which can readily be reported, the return was not above 6 per cent. Due to lack of sufficient appropriations in the present fiscal year, the Commission says, this work is limited to the class of carriers named and progress in this vital work in the fiscal year 1923 and 1924 is contingent upon the appropriation which may be granted by Congress for valuation work.

The estimate of \$1,000,000 recommended by the Bureau of the Budget does not include any allowance for bringing valuations up to date or investigations for the ascertaining of basic values for recapture purposes. The Commission's representatives have explained to the House committee on appropriations the need of restoring its original estimate of \$1,280,000, which includes \$180,000 for policing returns made by carriers to its valuation order No. 3 dealing with additions, betterments and retirements since the initial date of valuation and for utilizing these returns in bringing the valuations up to date.

While the matter of furnishing reports is still the subject of correspondence with a few other than Class I carriers, no carrier has refused to make a report in response to the Commission's orders regarding the report of excess earnings. The provisions of the law have been carefully studied by the Commission's legal advisors with a view to the institution of proper legal proceedings against delinquent carriers. A number of cases have been examined in this connection, but no suits have been instituted by the Commission. The report calls attention, however, to the fact that the Dayton-Goose Creek Railway has filed an injunction suit in the United States court in Texas contesting the constitutionality of the recapture clause and the application has been set for hearing at New Orleans on January 25.

The three Class I railroads which admitted excess earnings are the Buffalo & Susquehanna, \$18,906; Detroit & Toledo Shore Line, \$150,914, and Lehigh & New England, \$24,508. The Buffalo & Susquehanna in giving its reasons for not paying over half of its excess said that there has as yet been no determination of the amount which should be charged for depreciation and maintenance during the last four months of 1920. The Lehigh & New England said that its value had not yet been ascertained. The Detroit & Toledo Shore Line gave no reason.

The Commission's orders direct the reports as to excess earnings authorized the carriers to use preliminarily as a basis of value the values they had claimed for the purposes of the 1920 rate case with adjustments to bring them up to

date, with the understanding that they were to be corrected and adjusted later after the Commission had completed its final valuations. The carriers were also authorized to use other bases if properly supported. In the case of the roads whose property has been tentatively valued, the Commission reported the amount and dates of the tentative valuations, claims of the carriers, any excess earnings reported, and the excess as computed on the basis of the tentative valuations as to 13 Class I roads. The figures indicate that these railroads had admitted no excess earnings because of their claim of a valuation much higher than that shown in the tentative valuation report. For example, the Delaware & Hudson System claimed as its value as of December 31, 1921, a total of \$123,903,200. The tentative valuation used by the Commission as of 1916 was \$98,728,801. On this basis the Commission computed excess earnings amounting to \$1,698,634.

The Chicago & Eastern Illinois claimed \$89,430,163, while its tentative valuation was \$69,206,753, as of 1915, and on this basis the Commission computed \$334,775 of excess earnings. The Kansas City Southern system claimed \$105,702,398 and on this basis reported no excess earnings, but on the basis of the tentative valuation of \$49,445,907 as of 1914 the Commission computed excess earnings of \$1,939,823. The Pere Marquette claimed as its value \$125,773,813, whereas the Commission's tentative valuation as of 1915 was \$63,309,242 and on this basis the Commission computed excess earnings of \$609,690. The St. Louis Southwestern system claimed a value of \$137,000,000; its tentative valuation as of 1915 was \$56,714,295, and on this basis the Commission computed excess earnings of \$3,010,173. The Virginian system claimed a value of \$118,347,726; its tentative valuation as of 1916 was \$55,862,622, and on this basis the Commission computed excess earnings of \$2,312,542.

The other Class I roads as to which it computed excess earnings on the basis of the tentative valuations were: Ann Arbor system, \$69,424; Bangor & Aroostock, \$50,975; Elgin, Joliet & Eastern, \$1,269,388; Lake Superior & Ishpeming, \$241,268; Toledo, St. Louis & Western, \$642,430; Florida East Coast, \$1,269,388. The Commission then submitted a list of Class I roads whose properties have been valued by the Commission and whose returns do not show any excess earnings, together with the values which they claim as of 1920 and 1921. Of the 26 other than Class I roads which reported excess earnings, the Commission gives a list of nine which had paid excess earnings amounting to about \$42,000, but in the cases of several of these as to which it had made tentative valuations the Commission computes the excess earnings at a figure higher than that reported.

Answering that part of the resolution relating to the value of carrier property by states, the Commission said that up to the present time it had not undertaken to segregate by states the single sum value of interstate carriers. It had listed and shown separately by states in the tentative valuation reports served the property of carriers with a fixed situs, together with the cost of reproduction, but it had not allocated to states the general items of material, supplies and working capital or other elements of value without a fixed situs in any one state, although it had collected the basic data from which information as to the values separately by states could be compiled. This, however, the report said, is an activity for which no allowance is made in its valuation appropriation recommended by the Bureau of the Budget.

A FREIGHT CONDUCTOR was fined \$50 in a Municipal Court at Minneapolis, Minn., recently, for blocking traffic at a street crossing for 14 minutes. The sentence was suspended until January 31, with a promise to reduce the fine if no more complaints against the railroad are received. The railroad's attorney maintained that the delay was unavoidable because the conductor was under orders to permit a passenger train to pass.

Chronological Review

A Résumé of the Leading Events of the Year
Arranged for Ready Reference

JANUARY						
S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

DECEMBER						
S	M	T	W	T	F	S
					1	2
		3	4	5	6	7
		8	9	10	11	12
		13	14	15	16	17
		18	19	20	21	22
		23	24	25	26	27
		28	29	30		

1922

JANUARY

- January 1, 1922.—Chicago, Burlington & Quincy instituted a pension system for employees.
January 10.—Interstate Commerce Commission notified 49 railroads of its intention to require the installation of automatic train control.
January 11.—Interstate Commerce Commission began hearings on general rate inquiry.
January 14.—Pullman Company adopted a plan of reorganization, following its absorption of the Haskell & Barker Car Company.
January 23.—Labor Board announced new working rules for clerks.
January 30.—Fire caused \$2,000,000 damage to Great Northern ore docks at Superior, Wis.

FEBRUARY

- February 5.—Alaska railroad officially opened for through traffic.
February 7.—Missouri & North Arkansas was ordered sold by the United States District Court at Little Rock, Ark.
February 14.—Interstate Commerce Commission ordered increases in division of rates accruing to New England lines.
February 15.—National Association of Owners of Railroad Securities petitioned the Interstate Commerce Commission to approve plan for the pooling of all freight cars by the American Railway Service Corporation.
February 16.—Labor Board issued new working rules for signalmen.
February 18.—Interstate Commerce Commission authorized Chicago, Milwaukee & St. Paul to acquire control of Chicago, Milwaukee & Gary.
February 23.—Senate passed amendment to Valuation bill eliminating necessity of determining and reporting separately the original and present cost of condemnation and damages or of purchase in excess of such original cost or present value.
February 25.—Labor Board issued new working rules for express employees.
February 27.—Supreme Court handed down decision upholding right of Interstate Commerce Commission to increase intrastate rates.
February 28.—Labor Board issued new working rules for supervisors of mechanics.

MARCH

- March 1.—Provisions in Transportation Act for six per cent return and for government loans to railroads expired.

- March 4.—Labor Board announced new working rules for telegraphers.
March 7.—Labor Board began hearings on general wage reductions.
March 13.—Interstate Commerce Commission closed its general rate hearing.
March 15.—Chicago, Burlington & Quincy general office building in Chicago wrecked by fire.
March 16.—Pennsylvania arranged for an installation of train control on 49 miles of line between Lewistown and Sunbury, Pa.
March 27.—B. B. Jewell demanded recognition of a living wage as a basis of wage adjustments before the Labor Board.

APRIL

- April 1.—General coal strike took effect.
April 21.—International Railway Congress convened at Rome, Italy.
April 21.—Shopmen decided to send out strike ballots in contemplation of a nationwide strike.
April 24.—Hearings were begun before Interstate Commerce Commission on the consolidation of Southeastern roads but discontinued until a later date for want of evidence.
April 27.—B. W. Hooper elected chairman of the Labor Board to succeed R. M. Barton.
April 29.—United States District Court at Chicago rendered decision sustaining the Pennsylvania's right to specify manner of employee representation.

MAY

- May 11.—Labor Board handed down first decision against contracting of repairs, denying right of Indiana Harbor Belt to contract shop operation.
May 16.—G. R. Huntington elected president of the Minneapolis, St. Paul & Sault Ste. Marie to succeed Edward Pennington, elected chairman of the board of directors.
May 18.—Interstate Commerce Commission authorized New York Central to acquire Chicago Junction.
May 19.—A. W. Gibbs, chief mechanical engineer of the Pennsylvania, died.
May 20.—Railroad executives met at White House at the President's request to discuss freight rates.
May 24.—Interstate Commerce Commission prescribed a general ten per cent freight rate reduction, effective July 1, and fixed 5¾ per cent as a fair return on the aggregate value of all railway property.
May 29.—United States Supreme Court ordered the Southern Pacific to relinquish control of the Central Pacific.

JUNE

- June 1.—Safety Section of American Railway Association launched a nationwide campaign to reduce accidents at highway crossings.
- June 5.—United States Supreme Court held that unions can be sued.
- June 6.—Labor Board authorized wage reductions for shopmen of from five to ten cents per hour.
- June 15.—Interstate Commerce Commission issued order requiring 49 railroads to install automatic train control by January 1, 1925.
- June 17.—Labor Board authorized wage reductions, effective July 1, of railway employees other than shopmen.
- June 26.—A. S. Baldwin, vice-president of the Illinois Central, died.

JULY

- July 1.—Shopmen began nationwide strike in defiance of Labor Board.
- July 2.—Derailment of fast passenger train of Philadelphia & Reading occurred at Winslow Junction, N. J., killing seven and injuring 32 seriously.
- July 3.—Labor Board issued call for the formation of new labor organizations.
- July 4.—Interstate Commerce Commission issued priority orders governing movement of freight during shopmen's strike.
- July 4.—Maintenance-of-way employees decided not to join in shopmen's strike.
- July 11.—President Harding issued proclamation to protect interstate commerce from interference during the shopmen's strike.
- July 12.—Missouri Pacific passenger and freight trains collided near Leeds, Mo., killing four and injuring 103.
- July 13.—Secretary of War promised federal police protection in the event of failure of state governments to maintain law and order during shopmen's strike.
- July 13.—Strikers appealed to President Harding for settlement of shop strike.
- July 15.—W. M. Duncan and Stanton Ennes elected chairman of the board and president, respectively, of the Wheeling & Lake Erie.
- July 20.—President Harding called conference of railway executives to settle shopmen's strike.
- July 20.—Western Presidents' Committee on Public Relations resolved not to restore seniority rights to strikers as against new employees.
- July 20.—Labor Board terminated negotiations for ending strike.
- July 20.—United States Circuit Court of Appeals reversed ruling of United State District Court at Chicago concerning Pennsylvania controversy with Labor Board and held that it is within the power of the Labor Board to determine how employees may be represented.
- July 21.—Denver & Rio Grande Western placed in hands of receiver, with J. H. Young as receiver.
- July 26.—Senate Committee on Interstate Commerce completed its general investigation of railroad situation.
- July 28.—International & Great Northern sold to Central Trust Company of New York for \$5,000,000.
- July 31.—Missouri & North Arkansas resumed operations after a year's idleness.

AUGUST

- August 1.—W. A. Webb, formerly general manager of the Missouri, Kansas & Texas, was appointed head of South Australian Railways.

August 1.—Glenn E. Plumb, author of the Plumb plan of operating railroads, died.

August 1.—Labor Board concluded hearings on maintenance-of-way employees' wages.

August 1.—Railway executives rejected President Harding's peace proposal that all strikers be returned to service with seniority and other rights unimpaired.

August 5.—James M. Herbert, president of the St. Louis Southwestern, died.

August 7.—President Harding proposed a second plan to settle shopmen's strike, requesting roads to take strikers back and submit seniority question to the Labor Board.

August 11.—Railway executives accepted President Harding's second strike settlement plan to leave seniority question to the Labor Board.

August 15.—Shop crafts rejected President Harding's second peace proposal, as not guaranteeing seniority rights.

August 17.—H. G. Kelley, president of the Grand Trunk, resigned.

August 18.—President Harding addressed Congress on strike situation.

August 19.—Railway executives and leaders of train service employees conferred over strike issues.

August 23.—Railway executives in third meeting in shopmen's strike reaffirmed stand on seniority.

August 25.—Executives of roads were unable to reach a settlement with train service leaders concerning the shopmen's strike.

August 29.—Labor Board rejected living wage principle advanced by maintenance-of-way brotherhood.

August 30.—Chicago & Alton placed in receivership and W. G. Biedt appointed receiver.

SEPTEMBER

September 2.—S. Davies Warfield, president of the National Association of Owners of Railway Securities, proposed a plan of settling shopmen's strike, which subsequently developed into the Willard-Jewell plan.

September 7.—Sir Henry W. Thornton selected to head Canadian National.

September 8.—James T. Clark, president of the Chicago, St. Paul, Minneapolis & Omaha, died.

September 8.—United States District Court at Chicago granted United States attorney-general's request for a temporary injunction restraining striking employees from interfering with train operation.

September 11.—Sixteen roads completed separate peace agreements with shopmen, the men waiving the right to strike, the roads relinquishing right to appeal to courts and both parties agreeing to abide by decisions of the Labor Board.

September 11.—Legal battle commences over "Daugherty injunction."

September 13.—Robert Quayle, retired general superintendent of motive power and machinery of the Chicago & North Western, died.

September 16.—Chicago & North Western announced that it will install automatic train control on 12 miles of line.

September 19.—W. H. Finley, president of the Chicago & North Western, also elected president of the Chicago, St. Paul, Minneapolis & Omaha.

September 23.—United States District Court sustained Daugherty injunction.

OCTOBER

October 3.—Daniel Upthegrove was elected president of the St. Louis Southwestern.

- October 12.—Chicago, Rock Island & Pacific celebrated seventieth anniversary.
- October 14.—Labor Board granted wage increase to maintenance-of-way men.
- October 15.—J. W. Kendrick and T. A. Hamilton elected chairman of board and president, respectively, of reorganized International & Great Northern.
- October 17.—Southern Pacific applied to Interstate Commerce Commission for authority to retain control of Central Pacific.
- October 21.—Interstate Commerce Commission issued first "final valuation" in the case of the Evansville & Indianapolis.

NOVEMBER

- November 4.—Thomas DeWitt Cuyler, chairman of the Association of Railway Executives, died.
- November 11.—Interstate Commerce Commission denied authority to railroads to reduce rates to Pacific coast to meet water competition.
- November 17.—Hearings on the Interstate Commerce Commission's plan of railroad consolidations in the northwest were begun, the Hill roads voicing vigorous objections to the plan.
- November 23.—Railway clerks applied for wage increases.
- November 27.—Labor Board approved piece work on the New York Central.

DECEMBER

- December 8.—First steps were taken to create a National Transportation Institute when plan was endorsed by railway, agricultural and business men in Chicago.
- December 8.—President Harding suggested consolidation of Labor Board with Interstate Commerce Commission in address before Congress.
- December 13.—St. Louis-San Francisco purchased capital stock of International-Great Northern.
- December 13.—Southern Pacific passenger train collided with locomotive at Humble, Tex., killing 21 persons and injuring 14.
- December 13.—Missouri, Kansas & Texas sold and reorganized as Missouri-Kansas-Texas.
- December 15.—Labor Board announced new working rules for maintenance-of-way employees.
- December 21.—Chicago & Western Indiana Station, Chicago, seriously damaged by fire.
- December 27.—Interstate Commerce Commission ordered a general investigation and inspection of cars and locomotives.

Report of the Federal Fuel Distributor

WASHINGTON, D. C.

THAT THE CARRIERS co-operated to the fullest extent in the efforts to furnish an adequate supply of coal following the shortage created by the miners' strike is evidenced, says C. E. Spens, in a report to the President accompanying his resignation as federal fuel distributor, by the increased production, when consideration is given to the fact that they themselves were still suffering from the ravages of the shopmen's strike and the further fact that during this period offerings of tonnage of all character were extremely large.

The bituminous situation generally is in good shape, the report says. Complaints continue of shortage in car sup-

ply, but there are few complaints of current shortage of bituminous coal. There is, however, a demand in certain sections for greater opportunity to increase reserves due to a large extent to anticipated possible renewal of labor troubles this coming spring. With the seasonal reduction in other traffic, which, however, has been greatly retarded, the report says, additional power should be released for the transportation of coal, and while this power generally is not yet up to standard due to the shopmen's strike, barring extreme weather, which, of course, would further affect the railroads' capacity, it is hoped that the situation may be cared for without serious distress. Difficult weather might result quite seriously.

The report says that production has been increased to approximately 11,000,000 tons per week, while it is estimated that the current consumption is from eight and a half to nine million tons per week. The amount of bituminous coal in storage is estimated at at least 40,000,000 tons on December 1 as compared with 35,000,000 on November 1, 28,000,000 on October 1, 22,000,000 on September 1. The season's tonnage of cargo coal loaded into vessels at Lake Erie ports amounted to 18,501,055 tons, as compared with 22,412,380 in 1921 and 22,408,355 in 1920. In addition, there were 4,300,744 tons on hand on commercial docks at Upper Lake ports on April 1. The movement of soft coal from Illinois and Indiana and other districts this season also has been far in excess of that during last year so that the northern districts served principally by the lakes are said to be in a satisfactory condition so far as bituminous coal is concerned.

It is estimated that the production of anthracite this season will not exceed 60 per cent of last year's production. The lake anthracite program contemplated a movement of about 2,000,000 tons. Lake navigation closed with a movement of only 1,250,000 tons, but it is planned that this deficit shall be equalized by all-rail movement, which is now under way. The report calls attention to a continuous decline in the percentage of open top cars in bad order, the reduction from September 1 to December 1 being 4.3 per cent.

As to priorities in transportation, as contemplated by an amendment to the interstate commerce act, the instances where the federal fuel distributor has recommended issue of individual priorities have been comparatively few. Where applications for priorities have been received effort has been made to take care of such instances by increased car supply and by co-operation with shippers. In no instance has it been found necessary to invoke the penalties provided in the act. Mr. Spens also says he has enjoyed the most sincere co-operation on the part of the Interstate Commerce Commission, state fuel distributors, railroads and a large majority of the coal operators.

F. R. Wadleigh, of the Department of Commerce, who has been assistant to the federal fuel distributor, has been appointed by the President to succeed Mr. Spens as federal fuel distributor.

The Interstate Commerce Commission on December 30 issued Service Order No. 32 directing the Chesapeake & Ohio, Pennsylvania and the Baltimore & Ohio to give priority in the placement of hopper bottom cars for shipments of coal from specified mines to the government fuel yards at Washington, D. C. The Chesapeake & Ohio is directed to furnish five cars per day for 10 consecutive days to each of four mines named, the Pennsylvania to furnish five cars a day for five days to one mine and six cars a day for ten days to another, and the Baltimore & Ohio to furnish two cars a day for ten days to one mine.

Two shops of the Central Vermont, at St. Albans, Vt., the paint shop and the bridge shop, were destroyed by fire on December 26; estimated loss, including two passenger cars and a mail car, \$35,000.

General News Department

The Dixie Flyer, northbound, of the Central of Georgia was derailed near Rivoli, Ga., six miles north of Macon, on the morning of January 2, and ten cars altogether left the rails. Four cars fell down a 15-ft. bank and 24 passengers were injured. The train consisted of 14 cars and was running at about 30 miles an hour.

The Central of Georgia has extended the benefits of its pension plan to include the shopmen. The announcement of President Winburn, giving this information, says that under former conditions the benefit of the pension arrangement could not be conferred on the shopmen because their unions objected to physical examinations.

The Atchison, Topeka & Santa Fe has completed the construction of a branch line from Satanta, Kan., to Manter, a distance of 53.5 miles, and train service was established on January 1. The line was built under the charter of the Dodge City & Cimarron Valley and will be known as the Satanta district of the Western division of the latter system.

The Long Island Railroad now advertises itself weekly by radio telephone, the first message having been sent out from "WHN" (Ridgewood, N. Y.) on January 1. This first message, of about 400 words, consisted of a New Year's greeting to everybody, an apology for defects which passengers might find in the company's train service and an advertisement of Long Island as a home and as a pleasure resort.

The Automatic Train Control Order of the Interstate Commerce Commission issued last June has been amended to authorize the Delaware & Hudson to make its installation upon a full passenger locomotive division between Whitehall, N. Y., and Rouses Point, in place of the location designated in the original order, and to authorize the Louisville & Nashville to make its installation between Corbin, Ky., and Etowah, Tenn.

Violations of the "28-Hour Law," requiring livestock in transit to be fed and watered at least once in 28 hours, resulted, in the United States District Court at Pittsburgh, Pa., on December 29, in the imposition of penalties amounting to \$76,100 on the Pennsylvania Railroad and its subsidiary, the Pittsburgh, Cincinnati, Chicago & St. Louis. The reports say that the defendants pleaded guilty on 761 counts having to do with shipments made within a period of two years.

Christmas trees and free candy were the special entertainments for children traveling on the overland trains of the Southern Pacific on Christmas eve, Sunday, December 24. The company placed Christmas trees in the observation cars, and the dining car stewards acted as Santa Claus in the distribution of free candy to the "good little boys and girls" on the trains. The trees used for the occasion were of pure-blooded Southern Pacific strain—silver-tipped fir from the summit of the Sierra Nevada mountains.

Regulations for the transportation of explosives and other dangerous articles, as revised by the Interstate Commerce Commission, went into effect on January 1, superseding those heretofore in effect. All shippers of dangerous articles are required to inform themselves in regard to these regulations, which have the force of law; and Colonel B. W. Dunn, chief inspector of the Bureau of Explosives, 30 Vesey street, New York City, has issued a circular containing information concerning tariffs, labels and other documents which are of interest to shippers in this connection. These documents are prepared under the direction of Colonel Dunn and the circular gives the prices at which they will be furnished. The freight tariff costs 45 cents; the revised regulations, including shipping container specifications, 60 cents; labels one

dollar for 500. The Commission's requirements have been changed in numerous details. The standard labels may now be used for either freight or express.

Railroad Not Liable for Injuries to Circus Passengers

Eighty suits involving \$500,000 damages, based on the wreck of the Hagenback-Wallace circus train on the Michigan Central at Ivanhoe, Ind., on June 22, 1918, have been thrown out of court at Hammond, Ind., following the decision of the Indiana Appellate Court in the case of J. F. Diereck, against the railroad company. At the trial the railroad was able to show that a contract existed between the carrier and the circus management whereby the circus was to furnish the cars and the railroad would furnish engines and crews and lease the use of the right-of-way to the circus, the circus assuming all liability for injuries to its employees or equipment while in transit, in consideration of a reduced transportation rate.

D. T. & I. Deficit Increases

The deficit shown by Henry Ford's railroad, the Detroit, Toledo & Ironton, during the past few months continues to increase and for the 11 months ended with November was \$306,924, as compared with a net operating income of about the same amount for the corresponding period of 1921. Operating revenues for the 11 months increased \$2,126,574, while operating expenses increased \$2,226,696. There was also an increase in the debit balance of equipment rents of \$584,340. The report shows a considerable increase in expenditures for maintenance. The ratio of maintenance expenses to revenues for the 11 months was 45.6 as compared with 37.4 for 1921. The operating ratio was 85.9 as compared with 79.3.

Santa Fe Employees Fined \$10,000

The trainmen of the Atchison, Topeka & Santa Fe who were recently convicted in the United States District Court at Los Angeles, California, on charges of unlawfully obstructing railway traffic, have been sentenced to punishment by fines, not imprisonment. Judge Bledsoe, on January 2, imposed fines aggregating \$10,000 on the eight men convicted. This conspiracy was formed in connection with the strike last August when the men refused to work and passenger trains were held for days in the desert of eastern California and western Arizona. Judge Bledsoe pronounced sentence after assurance by counsel for the defense that the fines would be paid by the union organizations of which the defendants were members.

The defendants were C. L. Fox and C. E. Holly, Brotherhood of Locomotive Engineers; E. F. Fraseur, Brotherhood of Railway Trainmen; E. Arkbauer, Order of Railway Conductors; E. H. Reynolds, Brotherhood of Locomotive Firemen and Enginemen; R. H. Clements and John A. Stecklein, Railway Machinists Union, and L. E. Woodbeck, Switchmen's Union of North America. The fine against each was \$1,250. A stay of execution was granted for thirty days.

Meetings and Conventions

The following list gives names of secretaries, dates of next or regular meetings and places of meetings:

AIR BRAKE ASSOCIATION.—F. M. Nellis, 165 Broadway, New York City. Next convention, May 1-4, 1923, Hotel Albany, Denver, Colo. Exhibit by Air Brake Appliance Association.

AIR BRAKE APPLIANCE ASSOCIATION.—J. F. Gettrust, The Ashton Valve Company, 318 Washington St., Chicago. Meeting with Air Brake Association.

AMERICAN ASSOCIATION OF DINING CAR SUPERINTENDENTS.—L. A. Stone, C. & E. I. Ry., Chicago. Annual meeting, January 16-18, 1923, Hotel Sherman, Chicago.

- AMERICAN ASSOCIATION OF ENGINEERS.—C. E. Drayer, 63 E. Adams St., Chicago. Next convention, May 7-9, 1923, Norfolk, Va.
- AMERICAN ASSOCIATION OF GENERAL BAGGAGE AGENTS.—E. L. Duncan, 332 So. Michigan Ave., Chicago. Next meeting, May 9, 1923, Signal Mt. Inn, Chattanooga, Tenn.
- AMERICAN ASSOCIATION OF PASSENGER TRAFFIC OFFICERS.—W. C. Hope, C. R. R. of N. J., 143 Liberty St., New York.
- AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—J. Rothschild, Room 400 Union Station, St. Louis, Mo. Next convention, June 13-15, 1923, Kansas City, Mo.
- AMERICAN ELECTRIC RAILWAY ASSOCIATION.—J. W. Welsh, 8 W. 40th St., New York.
- AMERICAN RAILROAD MASTER TINNERS', COPPERSMITHS' AND PIPE FITTERS' ASSOCIATION.—C. Borchardt, 202 North Hamlin Ave., Chicago, Ill.
- AMERICAN RAILWAY ASSOCIATION.—J. E. Fairbanks, General Secretary, 75 Church St., New York, N. Y.
- Division I.—Operating. J. C. Caviston, 30 Vesey St., New York, N. Y.
- Freight Station Section (including former activities of American Association of Freight Agents). R. O. Wells, Freight Agent, Illinois Central Railroad, Chicago, Ill.
- Medical and Surgical Section. J. C. Caviston, 30 Vesey St., New York, N. Y.
- Protective Section (including former activities of the American Railway Chief Special Agents and Chiefs of Police Association). J. C. Caviston, 30 Vesey St., New York, N. Y.
- Safety Section.—J. C. Caviston, 30 Vesey St., New York.
- Telegraph and Telephone Section (including former activities of the Association of Railway Telegraph Superintendents).—W. A. Fairbanks, 30 Vesey St., New York, N. Y.
- Division II.—Transportation (including former activities of the Association of Transportation and Car Accounting officers).—G. W. Covert, 431 South Dearborn St., Chicago, Ill.
- Division III.—Traffic. J. Gottschalk, 143 Liberty St., New York.
- Division IV.—Engineering. E. H. Fritch, 431 South Dearborn St., Chicago, Ill. Annual meeting, March 13-15, 1923, Chicago. Exhibit by National Railway Appliances Association.
- Construction and Maintenance Section. E. H. Fritch.
- Electrical Section.—E. H. Fritch.
- Signal Section (including former activities of the Railway Signal Association).—H. S. Balliet, 30 Vesey St., New York, N. Y. Annual convention, March 13-15, Drake Hotel, Chicago.
- Division V.—Mechanical (including former activities of the Master Car Builders' Association and the American Railway Master Mechanics' Association).—V. R. Hawthorne, 431 South Dearborn St., Chicago, Ill. Exhibit by Railway Supply Manufacturers' Association.
- Equipment Painting Section (including former activities of the Master Car and Locomotive Painters' Association).—V. R. Hawthorne, 431 South Dearborn St., Chicago, Ill.
- Division VI.—Purchases and Stores (including former activities of the Railway Storekeepers' Association).—W. J. Farrell, 30 Vesey St., New York, N. Y. Annual Meeting, May 22-24, 1923, Chicago.
- Division VII.—Freight Claims (including former activities of the Freight Claim Association).—Lewis Pilcher, 431 South Dearborn St., Chicago, Ill.
- Car Service Division.—C. A. Buch, 718 18th St., N. W., Washington, D. C.
- AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W. Ry., 319 N. Waller Ave., Chicago. Next convention, October 16-18, 1923, Seattle, Wash. Exhibit by Bridge and Building Supply Men's Association.
- AMERICAN RAILWAY DEVELOPMENT ASSOCIATION.—A. Leckie, Industrial Agent, Kansas City Southern Ry., Kansas City, Mo. Annual meeting May 9-11, St. Louis, Mo.
- AMERICAN RAILWAY ENGINEERING ASSOCIATION.—(Works in co-operation with the American Railway Association, Division IV.) E. H. Fritch, 431 South Dearborn St., Chicago. Annual meeting, March 13-15, Chicago. Exhibit by National Railway Appliance Association.
- AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—(See American Railway Association, Division V.)
- AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—R. D. Fletcher, 1145 East Marquette Road, Chicago. Exhibit by Supply Association of the American Railway Tool Foremen's Association.
- AMERICAN SHORT LINE RAILWAY ASSOCIATION.—T. F. Whittelsey, Union Trust Bldg., Washington, D. C. Annual meeting, May 9, Washington, D. C.
- AMERICAN SOCIETY FOR STEEL TREATING.—W. H. Eisenman, 4600 Prospect Ave., Cleveland, Ohio. Sectional meeting, February 15 and 16, City Club, Chicago.
- AMERICAN SOCIETY FOR TESTING MATERIALS.—C. L. Warwick, 1315 Spruce St., Philadelphia, Pa. Annual meeting, June 25, Chalfonte-Haddon Hall Hotels, Atlantic City, N. J.
- AMERICAN SOCIETY OF CIVIL ENGINEERS.—Prof. J. H. Dunlap, University of Iowa, Iowa City, Ia. Annual meeting, January 17-19, 33 W. 39th St., New York. Regular meeting 1st and 3d Wednesdays in month, except July and August, 33 W. 39th St., New York.
- AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York.
- Railroad Division.—A. E. Stuebing, Manager Editor, Railway Mechanical Engineer, Woolworth Bldg., New York.
- AMERICAN TRAIN DISPATCHERS' ASSOCIATION.—C. L. Darling, 1310-1311 Malers Bldg., Chicago, Ill. Next convention, June 18, 1923, Chicago.
- AMERICAN WOOD PRESERVERS' ASSOCIATION.—S. D. Cooper, A. T. & S. Fe R. R., Topeka, Kan. Next meeting, January 23-25, 1923, St. Charles Hotel, New Orleans, La.
- ASSOCIATION OF RAILWAY CLAIM AGENTS.—H. D. Morris, Northern Pacific R. R., St. Paul, Minn. Next meeting, May 16-18, 1923, Brown Palace Hotel, Denver, Col.
- ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W., Room 411, C. & N. W. Sta., Chicago. Exhibit by Railway Electrical Supply Manufacturers' Association.
- ASSOCIATION OF RAILWAY EXECUTIVES.—Stanley J. Strong, 320 Munsey Bldg., Washington, D. C.
- ASSOCIATION OF RAILWAY SUPPLY MEN.—A. W. Clokey, 1658 McCormick Bldg., Chicago. Meeting with International Railway General Foremen's Association.
- ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—(See American Railway Association, Division I.)
- ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—(See American Railway Association, Division II.)
- BRIDGE AND BUILDING SUPPLY MEN'S ASSOCIATION.—John Nelson, Joseph E. Nelson & Sons, 3240 South Michigan Ave., Chicago. Meeting with convention of American Railway Bridge and Building Assn.
- CANADIAN RAILWAY CLUB.—W. A. Booth, 53 Rushbrook St., Montreal, Que.
- CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 626 North Pine Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Great Northern Hotel, Chicago.
- CAR FOREMEN'S ASSOCIATION OF ST. LOUIS, MO.—Thomas B. Koenek, 604 Federal Reserve Bank Bldg., St. Louis, Mo. Meetings, first Tuesday in month at the American Hotel Annex, St. Louis.
- CENTRAL RAILWAY CLUB.—Harry D. Vought, 26 Cortlandt St., New York. Regular meetings, 2d Thursday in January, March, May, September and November, Hotel Iroquois, Buffalo, N. Y.
- CHIEF INTERCHANGE CAR INSPECTORS' AND CAR FOREMEN'S ASSOCIATION.—W. P. Elliott, Terminal Railroad Association of St. Louis, East St. Louis, Ill.
- CHIEF INTERCHANGE CAR INSPECTORS' AND CAR FOREMEN'S SUPPLY MEN'S ASSOCIATION.—D. B. Wright, 34th St. and Artesian Ave., Chicago, Ill. Meeting with Chief Interchange Car Inspectors' and Car Foremen's Association.
- CINCINNATI RAILROAD CLUB.—W. C. Cooder, Union Central Bldg., Cincinnati, Ohio. Meetings, 2d Tuesday in February, May, September and November.
- EASTERN RAILROAD ASSOCIATION.—E. N. Bessling, 614 F St., N. W., Washington, D. C. Annual meeting May 10, 1923, Railroad Club, New York.
- FREIGHT CLAIM ASSOCIATION.—(See American Railway Association, Division VII.)
- GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—C. H. Treichel, Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Friday in month, Room 1414, Manhattan Bldg., Chicago.
- INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—W. J. Mayer, Michigan Central R. R., Detroit, Mich. Exhibit by International Railroad Master Blacksmiths' Supply Men's Association.
- INTERNATIONAL RAILROAD MASTER BLACKSMITHS' SUPPLY MEN'S ASSOCIATION.—George P. White, 747 Railway Exchange, Chicago. Meeting with International Railroad Master Blacksmiths' Association.
- INTERNATIONAL RAILWAY FUEL ASSOCIATION.—J. G. Crawford, 702 E. 51st St., Chicago. Next meeting, May, 1923, Cleveland, Ohio. Exhibit by International Railway Supply Men's Association.
- INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—Wm. Hall, 1061 W. Wabash Ave., Winona, Minn.
- INTERNATIONAL RAILWAY SUPPLY MEN'S ASSOCIATION.—C. W. Sullivan, Garlock Packing Co., 326 W. Madison St., Chicago. Meeting with International Railway Fuel Association.
- MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 26 Cortlandt St., New York.
- MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION.—(See A. R. A., Division V.)
- MASTER CAR BUILDERS' ASSOCIATION.—(See A. R. A., Division V.)
- NATIONAL ASSOCIATION OF RAILWAY TIE PRODUCERS.—Warren C. Nixon, Western Tie & Timber Co., 905 Syndicate Trust Bldg., St. Louis, Mo. Next convention, January 25-26, New Orleans, La.
- NATIONAL ASSOCIATION OF RAILWAY AND UTILITIES COMMISSIONERS.—James B. Walker, 49 Lafayette St., New York. Next convention, Dec. 4, 1923, Miami, Fla.
- NATIONAL FOREIGN TRADE COUNCIL.—O. K. Davis, 1 Hanover Square, New York. Tenth convention, April 25-27, 1923, New Orleans, La.
- NATIONAL RAILWAY APPLIANCE ASSOCIATION.—C. W. Kelly, People's Gas Bldg., Chicago. Annual exhibition at convention of American Railway Engineering Association.
- NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2d Tuesday in month, excepting June, July, August and September, Copley-Plaza Hotel, Boston, Mass.
- NEW YORK RAILROAD CLUB.—Harry D. Vought, 26 Cortlandt St., New York. Regular meetings, 3d Friday in month, except June, July and August, at 29 W. 39th St., New York.
- PACIFIC RAILWAY CLUB.—W. S. Wollner, 64 Pine St., San Francisco, Cal. Regular meetings, 2d Thursday in month, alternately in San Francisco and Oakland.
- RAILWAY ACCOUNTING OFFICERS' ASSOCIATION.—E. R. Woodson, 1116 Woodward Building, Washington, D. C. Next meeting, May 9, 1923, Richmond, Va.
- RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 600 Liberty Bldg., Broad and Chestnut Sts., Philadelphia, Pa.
- RAILWAY CLUB OF PITTSBURGH.—J. D. Conway, 515 Grandview Ave., Pittsburgh, Pa. Regular meetings, 4th Thursday in month, except June, July and August, Fort Hotel, Pittsburgh, Pa.
- RAILWAY DEVELOPMENT ASSOCIATION.—(See Am. Ry. Development Assn.)
- RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOCIATION.—J. Scriber, General Electric Co., Chicago. Annual meeting with Association of Railway Electrical Engineers.
- RAILWAY EQUIPMENT MANUFACTURERS' ASSOCIATION.—J. W. Fogg, Boss Nut Company, 1732 N. Kolmar Ave., Chicago. Meeting with Traveling Engineers' Association.
- RAILWAY FIRE PROTECTION ASSOCIATION.—R. R. Hackett, Baltimore & Ohio R. R., Baltimore, Md.
- RAILWAY REAL ESTATE ASSOCIATION.—R. H. Morrison, C. & O. Ry., Richmond, Va.
- RAILWAY SIGNAL ASSOCIATION.—(See A. R. A. Division IV, Signal Section.)
- RAILWAY STOREKEEPERS' ASSOCIATION.—(See A. R. A., Division VI.)
- RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION.—J. D. Conway, 1841 Oliver Bldg., Pittsburgh, Pa. Meeting with A. R. A., Division V.
- RAILWAY TELEGRAPH AND TELEPHONE APPLIANCE ASSOCIATION.—G. A. Nelson, 30 Church St., New York. Meets with Telegraph and Telephone Section of A. R. A., Division I.
- RAILWAY TREASURY OFFICERS' ASSOCIATION.—L. W. Cox, Commercial Trust Bldg., Philadelphia, Pa.
- ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—P. J. McAndrews, C. & N. W. Ry., Sterling, Ill. Next convention, September 18-20, 1923, Chicago. Exhibit by Track Supply Association.
- ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August.
- SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmunds, Sunbeam Electric Manufacturing Company, New York City. Meeting with American Railway Association, Signal Section.
- SOUTHERN AND SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, P. O. Box 1205, Atlanta, Ga. Regular meetings, 3d Thursday in January, March, May, July, September and November, Piedmont Hotel, Atlanta.
- SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—J. L. Carrier, Car Serv. Agt., Tenn. Cent. Ry., 319 Seventh Ave., North Nashville, Tenn.
- SUPPLY ASSOCIATION OF AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—H. S. White, 9 N. Jefferson St., Chicago.
- TRACK SUPPLY ASSOCIATION.—W. C. Kidd, Ramapo-Ajax Corporation, Hillburn, N. Y. Meets with Roadmasters' and Maintenance of Way Association.
- TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, 1177 East 98th St., Cleveland, Ohio. Exhibit by Railway Equipment Manufacturers' Association.
- WESTERN RAILWAY CLUB.—Bruce V. Crandall, 605 North Michigan Ave., Chicago. Regular meetings, 3d Monday each month, except June, July and August.

Equipment and Supplies

Locomotives

THE NEW YORK CENTRAL is asking for bids until 12 o'clock noon January 18 for the repair of from 25 to 50 locomotives.

THE CANADIAN NATIONAL, reported in the *Railway Age* of December 9, as inquiring for 65 locomotives, has ordered 43 from the American Locomotive Company.

THE LEHIGH & NEW ENGLAND, reported in the *Railway Age* of December 30 as inquiring for 3 consolidation type locomotives, has ordered this equipment from the American Locomotive Company.

E. F. ARARAQUARA (BRAZIL) has ordered two Mikado type locomotives from the American Locomotive Company. These locomotives will have 19 by 20 in. cylinders and a total weight in working order of 126,000 lb.

COSDEN & COMPANY, TULSA, OKLA., has ordered one 0-6-0 switching locomotive from the American Locomotive Company. This locomotive will have 21 by 26 in. cylinders and a total weight in working order of 146,000 lb.

THE CHICAGO & NORTH WESTERN, reported in the *Railway Age* of December 16 as inquiring for 18 Mikado type, 12 Pacific type and 20, 0-6-0 type switching locomotives, has ordered this equipment from the American Locomotive Company.

THE CLEVELAND CLIFFS IRON MINING COMPANY, Hibbing, Minn., has ordered three 0-6-0 switching locomotives from the American Locomotive Company. These locomotives will have 19 by 26 in. cylinders and a total weight in working order of 134,000 lb.

THE UNION PACIFIC, reported in the *Railway Age* of December 16 as inquiring for 78 locomotives has ordered 18, 2-10-2 type locomotives from the Baldwin Locomotive Works; 37, 2-10-2 type from the Lima Locomotive Works and 18, 2-10-2 type also 5 Mallet type from the American Locomotive Company.

Freight Cars

THE GREAT NORTHERN is in the market for 100, 12,000 gal. tank cars and for 1,000 box cars of 40 tons' capacity.

THE CENTRAL OF GEORGIA is inquiring for 1,000 stock cars; 300 55-ton hopper cars; 200 50-ton composite gondola cars and 500 box cars.

THE BALTIMORE & OHIO, reported in the *Railway Age* of December 16 as inquiring for 2,000 hopper cars, 1,000 gondola cars, and 2,000 box cars, has ordered 4,000 all steel hopper cars from the following companies: Pressed Steel Car Company 1,500, American Car & Foundry Company 1,000, Standard Steel Car Company 500, Youngstown Steel Car Company 500, and Ralston Steel Car Company 500. Contracts were also let for the 1,000 steel gondola cars to the Cambria Steel Car Company and for 1,000 box cars to the Standard Steel Car Company and 1,000 box cars to the Liberty Car & Equipment Co.

Passenger Cars

THE NEW YORK CENTRAL is inquiring for 9, 60-ft. 6-in. steel baggage and mail cars.

THE WESTERN PACIFIC is inquiring for 20, 70-ft. coaches; 8, 80-ft. dining cars and 20, 60-ft. baggage cars.

THE ATLANTA & WEST POINT, reported in the *Railway Age* of November 25 as inquiring for two steel baggage cars, has ordered this equipment from the Bethlehem Shipbuilding Corporation, Harlan plant.

THE UNION PACIFIC, reported in the *Railway Age* of December 30 as contemplating coming in the market for about 50 cars for passenger service, is asking for 21, 69-ft. steel baggage and mail cars, 10 steel dining cars and 18 steel observation cars.

Iron and Steel

THE CHICAGO, BURLINGTON & QUINCY has ordered 106 tons of structural steel for use near Dunlap, Mo., from the American Bridge Company.

THE GREAT NORTHERN, reported in the *Railway Age* of December 16 as being in the market for 3,345 tons of structural steel, has ordered 1,210 tons from the American Bridge Company.

Machinery and Tools

THE SEABOARD AIR LINE has ordered 2, 30-in. lathes from Joseph T. Ryerson & Son.

THE PENNSYLVANIA COAL COMPANY has ordered a rotary splitting shear from Joseph T. Ryerson & Son.

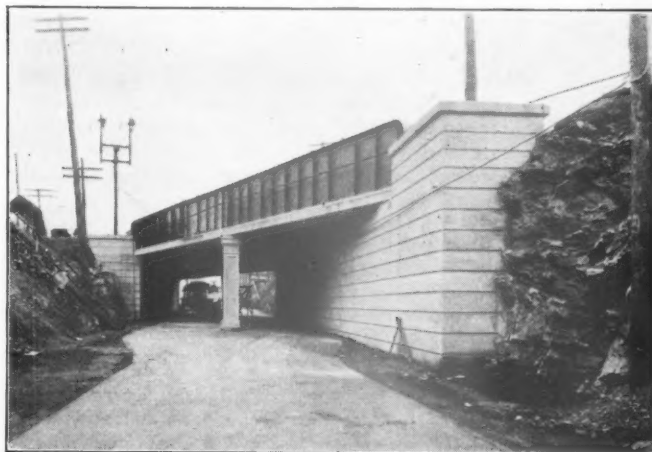
Miscellaneous

THE NEW YORK CENTRAL is asking for bids until 12 o'clock noon January 17 for steel wheels for the New York Central, Michigan Central, Cleveland, Cincinnati, Chicago & St. Louis, Pittsburgh & Lake Erie and Indiana Harbor Belt.

Signaling

THE PACIFIC ELECTRIC has ordered from the Union Switch & Signal Company material for an electric interlocking plant at La Habra, Cal.; seven levers, type F. There will be six signals, style T-2 and four switch movements, style M.

THE ATCHISON, TOPEKA & SANTA FE is to install Union Switch & Signal Company's continuous train control system on 101 miles of main line between Chillicothe, Ill., and the Mississippi river at Fort Madison, Iowa. Alternating current track circuits will be used throughout and the system will be operated by 6,600-volt, 60-cycle, 3-phase current, to be fed from power supplies at Chillicothe, Galesburg and Fort Madison. Both tracks are to be equipped for operating in both directions under the protection of the train control system. In addition to the present trailing crossover, a facing crossover will be installed at each of the 12 interlocking plants involved, to allow for crossover movements between main line tracks in either direction. A total of 125 locomotives will be equipped for train control operation. This company contemplates the extension of this system from Chillicothe eastbound to Chicago, a distance of about 130 miles.



A Recent Grade Crossing Elimination on the Philadelphia & Reading at Swatara, Pa.

Supply Trade News

The Pettibone Mulliken Company, Chicago, will add three one-story buildings to its plant at Chicago at a cost of approximately \$800,000.

William duPont of Wilmington, Del., has been elected a member of the board of directors and made chairman of the executive committee of the Miller Train Control Corporation.

J. H. Schwacke, manager of William Sellers & Co., Inc., Philadelphia, Pa., has been elected president. Mr. Schwacke has been in the service of this company for more than 60 years.

Frederick E. Brown, assistant to vice-president of the National Tube Company, has been elected a director and vice-president in charge of operations of the Pittsburgh Knife & Forge Company, Pittsburgh, Pa.

J. M. Spangler, manager railroad sales division of the National Carbon Company, Inc., with headquarters at Cleveland, Ohio, has been appointed assistant district manager, with headquarters at Chicago. Mr. Spangler was born at Middleburg, Pa., on December 2, 1889. He graduated from the electrical engineering department of Pennsylvania State College in 1911, and began railway work in the signal department of the New York Central Lines in the same year. From 1913 until 1915 he was connected with the Railroad Supply Company, Chicago, as sales representative in the signal department. In 1915 Mr. Spangler was appointed southwestern railroad sales engineer of the National Carbon Company, Inc., and in October, 1919, he was promoted to manager railroad sales division, which position he held until his recent promotion. He will be succeeded by A. E. Pratt, assistant manager railroad sales division, with headquarters at Cleveland, Ohio, whose photograph and sketch appeared in the *Railway Age* of January 21, 1922, page 253.



J. M. Spangler

Frank L. Morey, secretary of the Commonwealth Steel Company, St. Louis, Mo., has assumed the duties of treasurer. Harrison Hoblitzelle has been appointed manager of purchases and supplies, and will also continue his duties as assistant treasurer. Cecil R. Pilsbury has been appointed general auditor.

The Oxweld Acetylene Company, Newark, N. J., has moved its western department from 1077 Mission street, San Francisco, Cal., to larger quarters at 1050 Mission street. In the western department the company maintains offices also at Los Angeles, Portland, Seattle, Salt Lake City and El Paso. Leo Romney is manager of the western department.

The American Bolt Corporation, with headquarters at 17 Battery Place, New York City, has been organized and is a consolidation of the Bayonne Bolt & Nut Co., Bayonne, N. J., the Boss Nut Company, Chicago, Ill., the Standard Bolt Corporation, Cleveland, Ohio, and the Michigan Bolt & Nut Works, Detroit, Mich. Justin C. Burns is chairman of the board, at Columbus, Ohio; J. Rich Steers, president, New York City;

Frank S. Bigler, Detroit, Mich.; C. L. Rupf, New York City; J. A. MacLean, Chicago, and R. H. Hill, Detroit, Mich., are vice-presidents. Harley E. Burns is secretary and treasurer, Columbus, Ohio. The company manufactures Dieter and Boss nut locks, also a complete line of bolt and nut products.

H. F. T. Erben, manager of the Schenectady works of the General Electric Company, Schenectady, N. Y., has been appointed vice-chairman of the manufacturing committee. Mr. Erben will in future devote his entire time to general manufacturing. Charles E. Eveleth, assistant works manager, has been appointed manager of the Schenectady works to succeed Mr. Erben.

I. A. Bickelhaupt, advertising manager of the Pittsburgh-Des Moines Steel Company, Pittsburgh, Pa., will move temporarily to Richmond, Va., to open and organize a sales and construction office for this company. This office will have charge of business in the entire southeastern section from Baltimore, Md., on the north and from Birmingham, Ala., on the west.

Louis W. Siple, commercial engineer in the Philadelphia, Pa., office of the Safety Car Heating & Lighting Company, has resigned to become affiliated with A. J. Forschner in the Alfred J. Forschner Company. This company will have its headquarters in the Real Estate Trust building, Philadelphia, Pa., and will be sales agent for a complete line of construction equipment and contractors' supplies.

W. W. Scott, Jr., general manager of sales of the Laclede Steel Company, St. Louis, Mo., has been elected vice-president and S. R. Tyler, purchasing agent, has been elected secretary. Mr. Scott entered the steel business at the Homestead works of the Carnegie Steel Company, in the open hearth furnace department, after which he filled various mill positions. In 1919 he was made manager of sales of the Carnegie Steel Company, the Tennessee Coal, Iron & Railroad Company and the Illinois Steel Company, with headquarters in St. Louis. Early in 1922 he was appointed general manager of sales of the Laclede Steel Company. Mr. Tyler first served in the steel industry with the Republic Iron & Steel Company, at Moline, Ill., and afterwards at the various other plants of the Republic Company throughout the country. He was later employed in the operating department of Laclede Steel Company, and in 1917 was made purchasing agent.

The Westinghouse Air Brake Company, Wilmerding, Pa., has made the following appointments in the Eastern district: E. W. Davis, representative at New York of the Westinghouse Traction Brake Company, has been promoted to representative, Westinghouse Air Brake Company and Westinghouse Traction Brake Company, in charge of the Boston, Mass., office. G. H. Martin, mechanical expert for the Westinghouse Traction Brake Company, has been promoted to representative, Westinghouse Air Brake Company and Westinghouse Traction Brake Company, with headquarters at Boston. F. H. Whitney, representative of the Westinghouse Air Brake Company, has been promoted to export representative, Westinghouse Air Brake Company and Westinghouse Traction Brake Company, with headquarters at New York, and H. B. Gardner has been appointed representative, Westinghouse Air Brake Company, reporting to the New York office. Mr. Gardner was formerly with the Locomotive Stoker Company, Pittsburgh, whose service he entered in June, 1916. After serving for some time in the Stoker Company's shops, he was made mechanical expert and during the last few years was attached to the sales department of that company.

Obituary

John Henry Bass, president and founder of the Bass Foundry & Machine Company, Fort Wayne, Ind., died on December 17.

George H. Humphreys, president of the Steel Rail Supply Company, New York City, died on January 1 at his home, Bronxville, N. Y., at the age of 72.

Joseph Ralph, in charge of the labor department of the United States Steel Corporation, died from heart disease on December 30, in the offices of the corporation, New York City.

Oliver Crosby, managing partner and head of the manufacturing department of the American Hoist & Derrick Company, St. Paul, Minn., died on December 8, in that city, from anemia.

Warren Nixon, vice-president of the Western Tie & Timber Company, St. Louis, Mo., and secretary of the National Association of Railroad Tie Producers, as well as the editor of the Cross Tie Bulletin, published by that association, died in St. Louis on January 1.

C. J. Burkholder, supervisor of service of the Franklin Railway Supply Company, Inc., New York, died on December 22, in St. Mary's Hospital, Kansas City, following an operation. Mr. Burkholder was born on May 9, 1870. He began railroad work at Tyrone, Pa., and subsequently was a locomotive fireman and engineman on the Union Pacific. He then went to the Kansas City Southern as a locomotive engineman, later serving consecutively as traveling engineer, trainmaster, general road foreman of engines and division superintendent. He left the Kansas City Southern to become a mechanical representative of the Economy Devices Corporation, which was afterwards merged into the Franklin Railway Supply Company, Inc. During the period of the war, Mr. Burkholder returned to railroad work, leaving the Franklin Railway Supply Company, of which he was then western sales manager, on November 1, 1918, to become master mechanic of the Kansas City Southern. On January 1, 1921, he returned to the Franklin Railway Supply Company as special engineer assigned to work in connection with the locomotive booster, and since the following October was supervisor of service.

George J. Akers, general eastern railroad representative of Fairbanks, Morse & Co., with headquarters at New York, died December 25 at Portland, Me. He was born at Sacarappa

(Westbrook), Me., on December 1, 1847. On March 4, 1869, he entered the employ of Fairbanks, Morse & Co. as sales representative, with headquarters at Chicago, which position he held until 1888, when he was promoted to general eastern railroad representative. In 1914 this company opened an eastern office at New York and Mr. Akers was transferred to this office as general eastern railroad representative with headquarters at New York. He retired from this position in 1920, but remained more or less active until

his death. His business career with this company covered a period of 51 years.



G. J. Akers

TWELVE THOUSAND DOLLARS for the loss of a single package of freight was the verdict in a suit tried in Queens County, New York, last week. P. H. Keehon, head of a New York trucking firm, was held responsible in the sum of \$12,842.61 for the disappearance of a valuable consignment of gold and platinum wrist watches shipped from Paris. The jury awarded this sum to the European Watch and Clock Company, the consignor. It was shown that the package containing the jewelry had been turned over to the trucking concern carefully sealed by the shipper. When it was delivered to the New York office of the watch company it was discovered that the package contained nothing but a few watch crystals and some paving brick.

Railway Construction

BALTIMORE & OHIO.—This company has awarded a contract to the Graver Corporation, Chicago, for the construction of a 50,000-gal. capacity water softener at Mansfield, Ohio.

BOYNE CITY, GAYLORD & ALPENA.—This company has applied to the Interstate Commerce Commission for a certificate authorizing construction of a branch line from Alpena to Rockport, Mich., 13 miles.

CENTRAL OF GEORGIA.—This company will close bids on January 22 for the construction of a 600-ton capacity concrete coaling station at Macon, Ga.

CHESAPEAKE & OHIO.—This company, which was reported in the *Railway Age* of December 23, as contemplating the construction of a fruit terminal at Cincinnati, Ohio, advises that it is not considering the erection of a terminal at Cincinnati at this time.

CHICAGO UNION STATION.—This company is calling for bids for the construction of 12 concrete piers to support the tracks of the Metropolitan Elevated Railway, which cross over the property of the Chicago Union Station Company.

ILLINOIS CENTRAL.—This company will construct 9,000 ft. of mine track from Providence, Ky., to the mine of the St. Bernard Mining Company. This company will also construct a brick passenger station at Covington, Tenn., at an approximate cost of \$65,000.

ILLINOIS CENTRAL.—This company, which was reported in the *Railway Age* of December 30 as calling for bids for the construction of a two-story brick washroom at Memphis, Tenn., has awarded the contract to the Ellington-Miller Construction Company, Chicago. This railroad will close bids on January 8 for the construction of a one-story frame passenger station in South Chicago, to cost approximately \$18,000.

MISSOURI, KANSAS & TEXAS.—This company will close bids on January 12 for the construction of a six-stall addition to the roundhouse and a new power house at Franklin Junction, Mo.

MISSOURI PACIFIC.—This company will construct a 21 ft. by 20 ft. brick addition to its passenger station at Council Grove, Kan., and will make extensive alterations to the present brick station.

MONTANA RAILWAY.—This company which is being incorporated at Miles City, Mont., will begin early in 1923 the construction of a line from Miles City to Sheridan, Wyo. Definite plans for grading have not yet been completed. C. J. Haskell, 347 Madison avenue, New York City, is president of the company and C. S. Lake, at the same address, is chief engineer.

UNION PACIFIC.—This company, which was reported in the *Railway Age* of December 23 as having completed plans for the construction of new shop and yard facilities at Los Angeles, Cal., will begin work on the first unit of the improvements at once. The new terminal is to be located between Jaboneria road and Telegraph road, south of Ninth street on the main line in the eastern part of Los Angeles. The principal structures of the first unit, which will cost approximately \$1,750,000, are a 20-stall brick engine house, a 100-ft. turntable, a locomotive erecting and boiler shop, a coach, car and blacksmith shop and a car repair shop with related facilities, including transfer table, storehouse, lumber and iron sheds, office buildings, power house, oil house and oil supply system. Approximately 18 miles of track will be laid in the receiving, classification and departure yards, and in the engine terminal and car repair yards. Bids for this work will be called for shortly. This company has also authorized the necessary street and track work required to make its property in the vicinity of the new terminal available for industries.

THE CHICAGO, BURLINGTON & QUINCY, announces that it had completed the fourth year in which no passengers have been killed in train accidents on the lines operated by the company.

Railway Financial News

BALTIMORE, CHESAPEAKE & ATLANTIC.—*Foreclosure Sale Expected.*—See Maryland, Delaware & Virginia.

CENTRAL NEW YORK SOUTHERN.—*Asks Authority to Abandon Line.*—This company has applied to the Interstate Commerce Commission for authority to abandon its entire line from Auburn to Ithaca, N. Y., 38 miles, on the ground that it has not earned operating expenses for four years.

CHICAGO GREAT WESTERN.—*Authorized to Issue Securities.*—This company has been authorized by the Interstate Commerce Commission to issue \$10,206,000 of first mortgage, 50-year, 4 per cent gold bonds and \$3,580,000 of 4 per cent preferred stock in connection with the acquisition of the \$12,000,000 of first mortgage 4 per cent bonds of the Mason City & Fort Dodge.

CHICAGO GREAT WESTERN.—*Partial Payment on Guaranty.*—The Interstate Commerce Commission has certified a partial payment to this company of \$125,000 on account of its guaranty for the six months' period of 1920.

CHICAGO & ALTON.—*Authorized to Issue Receivers' Notes.*—The Interstate Commerce Commission has authorized an issue of \$2,000,000 of receivers' notes maturing in 18 months.

The protective committee of the holders of Chicago & Alton 3½ per cent first lien 50-year gold bonds, due July 1, 1950, of which F. H. Ecker is chairman, calls attention to the default in payment of interest due January 1, 1923, and of the authorization of the issuance and sale of \$2,000,000 receivers' certificates, which, in certain respects, rank prior to the bonds. The announcement also states that application will be made to list on the New York Stock Exchange the transferable certificates of deposit issued against all bonds deposited with the Farmers Loan & Trust Company as depository for the protective committee.

DAYTON, TOLEDO & CHICAGO.—*Authorized to Abandon Line.*—The Interstate Commerce Commission has issued a certificate authorizing the receiver to abandon as to interstate and foreign commerce the line from Delphos to Stillwater Junction, Ohio, 90 miles.

Railroad Administration Settlements

The United States Railroad Administration reports the following final settlements, and has paid out to the several roads the following amounts:

Chesterfield & Lancaster.....	\$12,000.00
Charlotte, Monroe & Columbia.....	15,000.00
Marion & Southern	17,000.00
Florida Central & Gulf.....	31,000.00
Tampa & Gulf Coast.....	36,000.00
Raleigh & Charleston.....	50,000.00
East & West Coast.....	51,000.00
Tampa Northern	126,500.00
Macon, Dublin & Savannah.....	183,000.00
Wichita Union Terminal	6,000.00

Dividends Declared

Atchison, Topeka & Santa Fe.—Common, \$1.50, quarterly, payable March 1 to holders of record, January 26.

Central of New Jersey.—\$2.00, quarterly, payable January 15 to holders of record January 9.

Illinois Central.—Common, 1¼ per cent, quarterly, preferred, 3 per cent, semi-annually; both payable March 1 to holders of record February 22.

Norfolk & Western.—Adjustment preferred, \$1.00, quarterly, payable February 19 to holders of record January 31.

Pennsylvania Company.—3 per cent, semi-annually; 20 per cent, extra; both payable December 30 to holders of record December 27.

Trend of Railway Stock and Bond Prices

	Jan. 2	Last Week	Last Year
Average price of 20 representative railway stocks	65.38	64.88	55.51
Average price of 20 representative railway bonds	85.58	85.02	80.80

Railway Officers

Executive

W. L. Martin, vice-president in charge of traffic of the Minneapolis, St. Paul and Sault Ste. Marie, retired from active service on January 1. **F. R. Newman**, general traffic manager, has assumed all duties formerly under the jurisdiction of Mr. Martin.

Operating

D. H. Dailey, assistant trainmaster on the Chicago & Alton, with headquarters at Girard, Ill., has been promoted to trainmaster, with headquarters at Peoria, Ill.

G. L. R. French, general superintendent of the Rutland, has been appointed acting general manager, succeeding **George T. Jarvis**, vice-president and general manager, who has been granted a leave of absence from January 1.

F. D. Pendell, superintendent of the Northern Wisconsin division of the Chicago & North Western, with headquarters at North Fond du Lac, Wis., retired on pension on January 1. **S. A. Morrison**, assistant superintendent of the Wisconsin division, with headquarters at Milwaukee, Wis., has been promoted to superintendent of the Northern Wisconsin division, with headquarters at North Fond du Lac, Wis., succeeding Mr. Pendell.

W. A. Keavy, assistant superintendent of terminals for the Michigan Central with headquarters at West Detroit, Mich., has been promoted to trainmaster with headquarters at Detroit. **G. E. Goodship** has been appointed assistant superintendent of terminals with headquarters at West Detroit, Mich., succeeding Mr. Keavy. **L. L. Emery** has been appointed trainmaster with headquarters at Jackson, Mich., succeeding G. H. Meese who has been transferred.

J. Walliser, trainmaster of the Chicago & North Western with headquarters at Council Bluffs, Iowa, has been promoted to assistant superintendent, Wisconsin division, with headquarters at Milwaukee, Wis. **H. A. Parish**, trainmaster, Minnesota division, with headquarters at Waseca, Minn., has been transferred to the Iowa division with headquarters at Council Bluffs, succeeding Mr. Walliser. **R. H. Johnson** has been appointed trainmaster, Minnesota division, with headquarters at Waseca, Minn., succeeding Mr. Parish.

Mechanical

A. H. Oelkers has been appointed chief mechanical engineer of the St. Louis-San Francisco with headquarters at Springfield, Mo.

C. H. Holdredge, assistant general air brake inspector on the Southern Pacific, with headquarters at Los Angeles, Cal., has been promoted to district road foreman of engines, with headquarters at the same place, succeeding A. M. Meston, who has resigned.

B. M. Brown, master mechanic for the Southern Pacific lines with headquarters at El Paso, Tex., has been promoted to assistant superintendent of motive power and equipment with headquarters at Algiers, La. **W. B. Lieck**, general foreman at El Paso, has been promoted to master mechanic with the same headquarters, succeeding Mr. Brown.

Engineering, Maintenance of Way and Signaling

J. P. Davis, roadmaster of the Central Indiana, with headquarters at Anderson, Ind., has been promoted to engineer maintenance of way, with the same headquarters. **J. H. Ramsey** has been appointed assistant engineer maintenance of way, with the same headquarters. The office of roadmaster has been abolished, the duties being included with those of the engineer maintenance of way.